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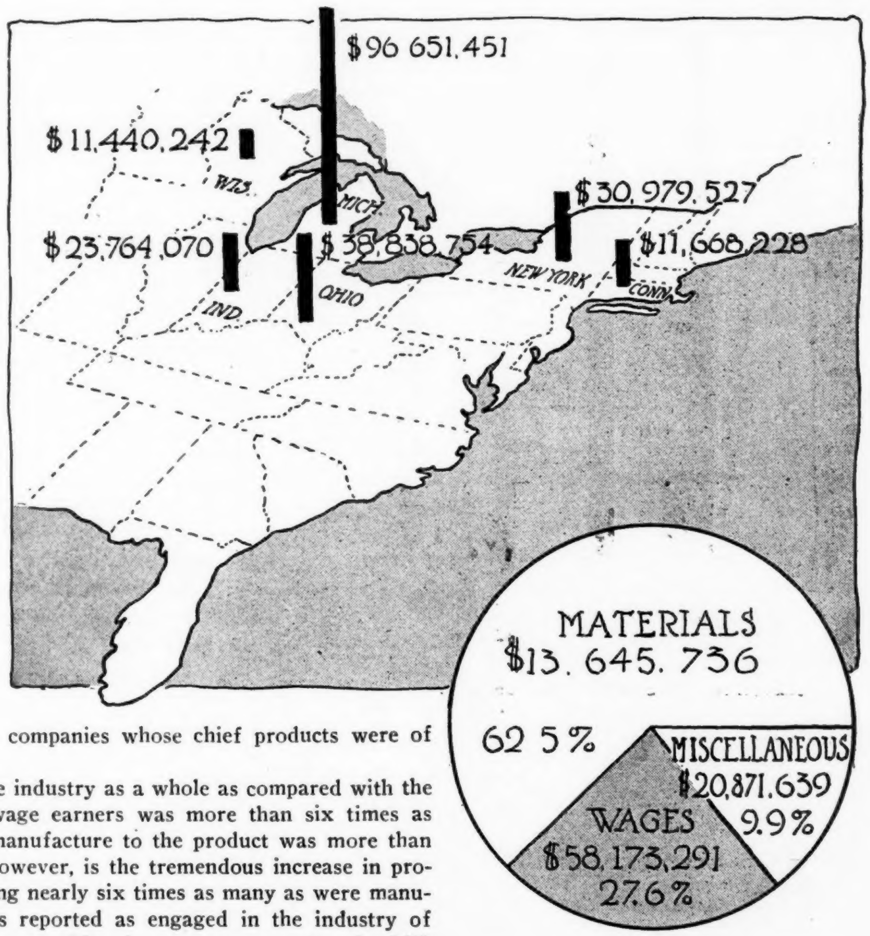
The Automobile

Milestones—A Master Stride Made by a World's Industry

Census Shows Sixfold Increase Over 1904—Products Worth $249,202,075

Digested from a Special U. S. Census Bulletin

By Donald McLeod Lay



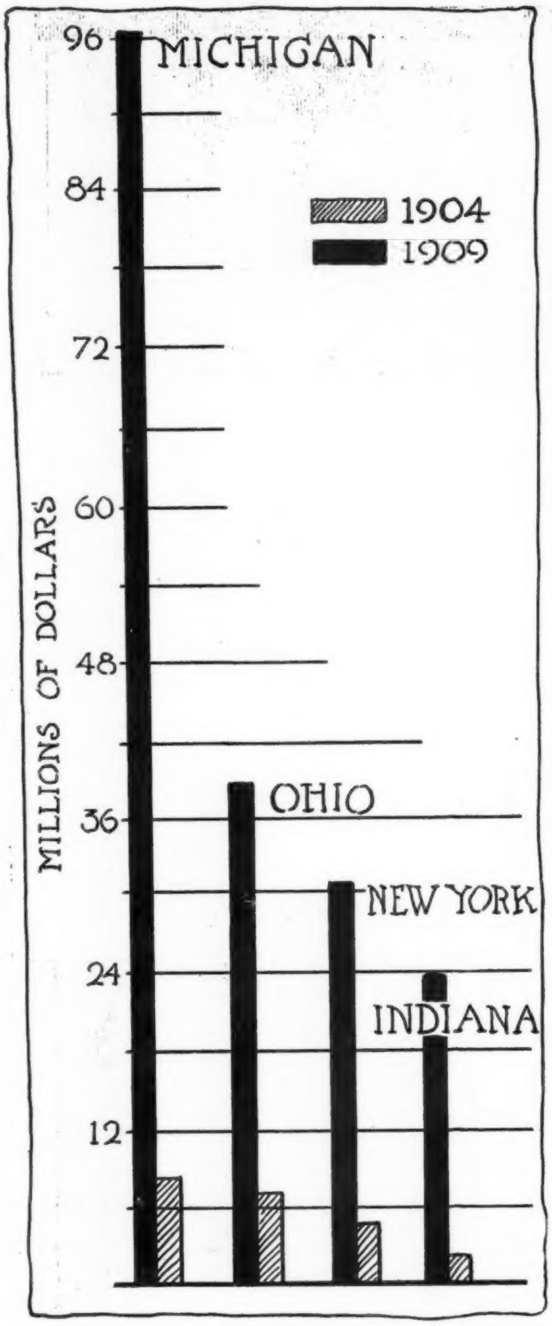
The map in perspective gives an idea of the standing of the leading states in the automobile industry in respect to the value of automobile products for 1909. In the circle is shown the distribution of the total expenses of the industry for that year

IN the year 1909 there were 265 establishments manufacturing automobiles as their chief product, according to the figures given in the bulletin for the thirteenth census of the United States. These companies turned out 126,593 automobiles at a total production expense of $210,690,666, or an average manufacturing cost of $1,607 per car. Of this total expense, $131,645,736, or 62.5 per cent., represented materials; $48,693,867, or 23.1 per cent., wages; $9,479,424, or 4.5 per cent., salaries and $20,871,639, or 9.9 per cent., miscellaneous expenses.

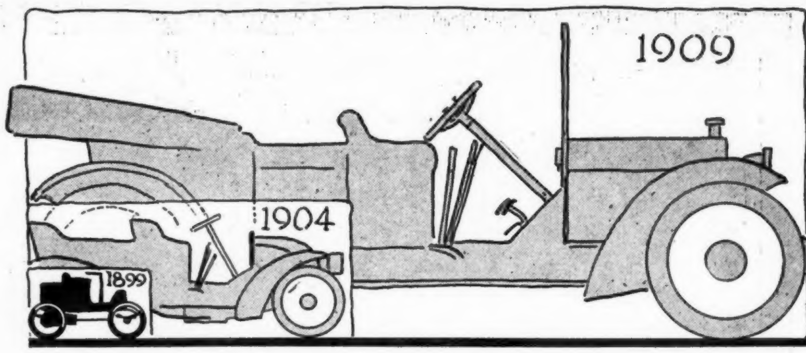
In addition to the automobiles built by the establishments classified as belonging primarily to this industry, 694 cars were turned out by companies whose chief products were of a different character.

The census showed a marvelous growth in the industry as a whole as compared with the census covering 1904. In 1909 the number of wage earners was more than six times as great as it was in 1904 and the value added by manufacture to the product was more than seven times as great. Most significant of all, however, is the tremendous increase in production, the number of cars turned out in 1909 being nearly six times as many as were manufactured in 1904. There were 743 establishments reported as engaged in the industry of manufacturing automobiles, bodies and parts in 1909, fifty-six, or 7.5 per cent., of which had products valued at more than $1,000,000 each.

Of these establishments, only 265 manufactured automobiles as their article of chief value, but they employed more than two-thirds of the average number of wage earners engaged in the entire industry. The total value of products in the year 1909 for the two branches of the industry combined was $249,202,075. Of this great sum, $193,823,108 was the value of products reported by the establishments primarily devoted to the building of automobiles and $55,378,967 that reported by the bodies and parts makers. These figures, of course, in-



Values of the automobile production of the four leading states for 1904 and 1909



Growth of production. For the 3 years, 1899, 1904 and 1909, the number of Automobiles made were 3,723, 21,692 and 126,593

volved a very considerable duplication so that they are not as reliable a basis for comparison as the total value of the complete machines manufactured, which was $164,269,324.

Between 1904 and 1909 the manufacture of automobiles, including bodies and parts, advanced in rank among the manufacturing industries of the country from seventy-seventh to twenty-first place with respect to the value of products and from seventieth to twentieth place with respect to the average number of wage earners.

Michigan the Predominant Producer

Michigan is shown to be by far the leading state in the automobile industry, standing first in 1909 as in 1904 in respect to the average number of wage earners employed, the value of products and the value added by manufacture. The wide margin of leadership held by the state may be readily realized by a glance at the illustration at the left. The average number of wage earners employed in establishments manufacturing automobiles, bodies and parts in Michigan and the value added by manufacture were more than nine times as great in 1909 as in 1904, while the gross value of products was more than twelve times as great as at the time of taking the earlier census. In 1909 the factories in Michigan reported 33.6 per cent. of the average number of wage earners employed in the industry, 38.8 per cent. of the value of products and 36.4 per cent. of the value added by manufacture. In 1909, 71.6 per cent. of the wage earners, 76.3 per cent. of the value of products and 74.9 per cent. of the value added by manufacture were reported from only four states: Michigan, Ohio, New York and Indiana. In the case of each of the states for which separate figures are given in the table at the top of page 363, large percentages of increase are shown for the period of 1904 to 1909. During this time several changes took place in the standing of the different states as determined by the value of products. The three leading states, Michigan, Ohio and New York, held the same ranks at both censuses as did Wisconsin, which stood sixth. Indiana showed the most pronounced gain, having advanced from seventh place in 1904 to fourth in 1909. Illinois moved up one place, becoming eighth instead of ninth, as did California, becoming thirteenth instead of fourteenth. On the other hand, Massachusetts dropped from fifth place in 1904 to seventh in 1909.

COMPARATIVE STATISTICS OF ESTABLISHMENTS, EMPLOYEES, WAGES, ETC., IN THE AUTOMOBILE AND BODY AND PARTS INDUSTRIES FOR 1904 AND 1909

	AUTOMOBILES			AUTOMOBILE BODIES AND PARTS		
	1909	1904	Per Cent of Increase	1909	1904	Per Cent of Increase
Number of establishments	265	121	119.0	478	57	738.6
Persons engaged in the industry	58,142	11,246	417.0	27,217	2,087	1204.1
Proprietors and firm members	83	53	56.6	322	50	544.0
Salaried employees	6,765	954	609.1	2,468	227	987.2
Wage earners (average number)	51,294	10,239	401.0	24,427	1,810	1249.6
Primary horsepower	50,641	7,624	564.2	24,909	2,485	902.4
Capital	$134,592,965	$20,555,247	554.8	$39,244,146	$2,528,613	1452.0
Expenses	$163,647,228	$22,859,882	615.9	$47,043,438	$2,973,854	1481.9
Services	$39,854,578	$7,255,375	449.3	$18,318,713	$1,160,842	1478.1
Salaries	$6,674,104	$1,076,425	520.0	$2,805,320	$180,834	1451.3
Wages	$33,180,474	$6,178,950	437.0	$15,513,393	$980,008	1483.0
Materials	$107,731,446	$11,658,138	824.1	$23,914,290	$1,493,227	1501.5
Miscellaneous	$16,061,204	$3,946,369	307.0	$4,810,435	$319,785	1404.3
Value of products	$193,823,108	$26,645,064	627.4	$55,378,967	$3,388,472	1534.3
Value added by manufacture (Value of products less cost of materials).	$86,091,662	$14,986,926	474.4	$31,464,677	$1,895,245	1560.2

STATISTICS OF THE AUTOMOBILE INDUSTRY FOR 1904 AND 1909, INCLUDING BODIES AND PARTS

State	Number of Establishments: 1909	Wage Earners				Value of Products				Value Added by Manufacture				Percent of Increase: 1904-1909*		
		Average Number 1909	Per Cent of Total: 1909	Rank 1909	Rank 1904	Amount: 1909	Per Cent of Total: 1909	Rank 1909	Rank 1904	Amount: 1909	Per Cent of Total: 1909	Rank 1909	Rank 1904	Wage Earners (Average Number)	Value of Products	Value Added by Manufacture
United States	**743**	**75,721**	**100.0**	..	..	**$249,202,075**	**100.0**	..	..	**$117,556,339**	**100.0**	..	..	**528.4**	**729.7**	**596.3**
Michigan	113	25,444	33.6	1	1	96,651,451	38.8	1	1	42,769,030	36.4	1	1	841.3	1,108.6	839.2
Ohio	75	12,130	16.0	2	2	38,838,754	15.6	2	2	20,316,756	17.3	2	2	345.6	510.9	434.0
New York	113	9,861	13.0	3	3	30,979,527	12.4	3	3	16,071,425	13.7	3	3	433.3	627.2	583.0
Indiana	67	6,797	9.0	4	6	23,764,070	9.5	4	7	8,769,201	7.5	4	7	733.0	1,349.9	976.0
Connecticut	28	3,815	5.0	7	4	11,668,228	4.7	5	4	6,811,924	5.8	5	4	....	....	....
Wisconsin	30	4,298	5.7	5	7	11,440,242	4.6	6	6	6,100,028	5.2	6	6	....	....	....
Massachusetts	62	4,138	5.5	6	5	11,359,224	4.6	7	5	5,867,746	5.0	7	5	276.2	326.5	320.6
linois	65	2,382	3.1	9	9	7,153,818	2.9	8	9	3,174,699	2.7	8	9	1,326.3	1,903.9	1,195.9
Pennsylvania	44	3,199	4.2	8	8	6,531,733	2.6	9	8	2,480,880	2.1	9	8	465.2	432.8	297.0
New Jersey	24	1,024	1.4	10	10	2,007,516	0.8	11	10	1,115,339	0.9	11	10	....	....	....
Missouri	17	368	0.5	13	11	1,676,840	0.7	12	11	651,696	0.5	13	11	....	....	....
California	41	478	0.6	12	14	1,470,169	0.6	13	14	770,441	0.7	12	14	....	....	....
Iowa	11	248	0.3	14	..	580,106	0.2	14	..	254,414	0.2	14	..	....	....	....
Maryland	5	202	0.3	15	..	532,761	0.2	15	..	247,646	0.2	15	..	....	....	....
Minnesota	11	130	0.2	16	17	429,286	0.2	16	15	175,993	0.2	17	15	....	....	....
Colorado	4	82	0.1	18	..	206,408	0.1	18	..	147,585	0.1	18	..	....	....	....
Texas	4	56	0.1	19	..	183,580	0.1	19	..	62,152	0.1	20	..	....	....	....
Nebraska	6	18	†	21	..	57,423	†	22	..	29,176	†	23	..	....	....	....
Washington	5	14	†	23	..	56,358	†	23	..	33,888	†	22	..	....	....	....
All other states	18	1,037	1.4	..	..	3,614,581	1.4	..	..	1,706,320	1.5	..	..	....	....	....

*Percentages are based on figures in Table 22. Percentages are omitted where comparable figures can not be given or where base is less than 100 for wage earners, or less than $100,000 for value of products or value added by manufacture.

†Less than one-tenth of one per cent.

Of the automobiles turned out by establishments engaged in the industry in 1909, 95.1 per cent. were gasoline vehicles, the proportion being considerably larger than was the case 5 years previous when the percentage was 86.2. The number of gasoline cars made in 1909 was almost six times as great as the amount made in 1904. Steam and electric vehicles gain much more slowly in number, showing increases of 51.4 and 168.5 per cent. respectively, and each of these classes constituted a smaller proportion of the total number in 1909 than at the preceding census.

In 1904 more steam than electric automobiles were reported but in 1909 the reverse was true. For each of the three kinds of automobiles, gasoline, electric and steam, a greater relative increase is shown in the value than in the number, as may be seen by referring to the small table at the side of this page. This does not necessarily mean an increase of prices but simply an increase in the proportion of more expensive machines.

Cars Made in Twenty-Four States

The manufacture of automobiles in establishments whose products of chief value were either completed cars or bodies and parts was carried on in 1909 in twenty-four different states. The bulk of the output, however, was confined to only a few states. The companies in Michigan, Ohio, Indiana and New York together reported 104,416 automobiles, valued at $129,024-379, or 82.5 per cent. of the total number manufactured, and 78.5 per cent. of the total value shown for the automobile industry in 1909. This compares very favorably with the 17,761, or 68 per cent. of the total number manufactured, in 1904, and with the $16,249,720, or 68.4 per cent. of the total value in that year.

Indiana and Ohio ranked second and third, respectively in 1909 in the total number of automobiles produced, but in the value of the output Ohio stood second and Indiana third. While less than half as many automobiles were made in New York as in Indiana, the value of all machines produced in the former state was practically equal to that reported for the latter.

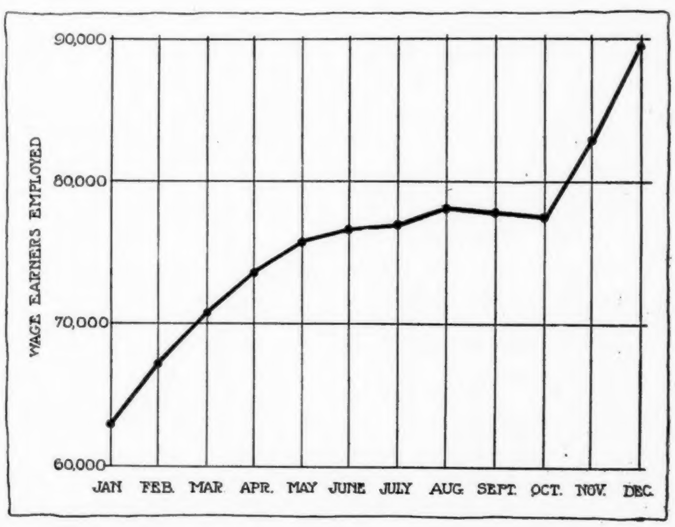
Of the total number of automobiles manufactured in 1909, more than half, or 64,262 (53.4 per cent.), and $69,130,223, or 45 per cent. of their total value, was reported by Michigan for the year 1909.

Ohio was the leading state in the production of electric and steam automobiles in 1909, manufacturing 37.6 per cent. of the total value of electrics turned out in the country and 81 per cent. of the steam vehicles.

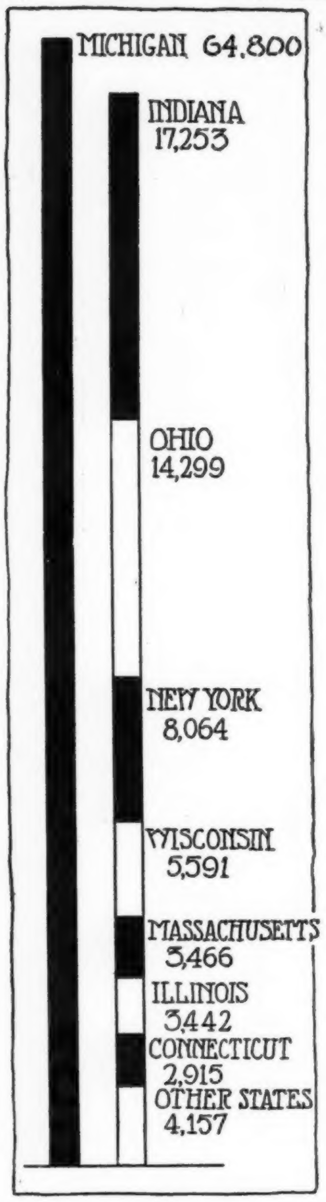
NUMBER OF ESTABLISHMENTS, CARS MADE AND THEIR VALUE FOR 1904 AND 1909

	1909	Per Cent Distribution, 1909	1904	Per Cent Distribution, 1904	Per Cent of Increase 1904–1909
Number of establishments	265	......	121	......	119.0
Automobiles*					
Number	126,593	100.0	21,692	100.0	483.6
Value	$164,269,324	100.0	$23,751,234	100.0	591.6
Gasoline:					
Number	120,393	95.1	18,699	86.2	543.8
Value	$153,529,653	93.5	$19,566,941	82.4	684.6
Electric:					
Number	3,826	3.0	1,425	6.6	168.5
Value	$7,259,430	4.4	$2,496,255	10.5	190.8
Steam:					
Number	2,374	1.9	1,568	7.2	51.4
Value	$3,480,241	2.1	$1,688,038	7.1	106.2

*Statistics for 1909 include 23 automobiles, valued at $65,800, of which 1 was gasoline, and 22 were electric, made in establishments whose principal products were automobile bodies and parts, but do not include 694 automobiles, valued at $830,080, reported by establishments in other industries, chiefly the carriage and wagon industry.



Curve showing the increase from month to month in the average number of wage-earners employed thoughout the automobile industry during the entire year of 1909



Michigan surpassed all other states combined in production

The table at the bottom of this page gives a clear idea of the production of various types and classes of motor driven vehicles in the leading states in 1909 and 1904. The most important of the types in point of numbers and of value is the touring car class, the total number of these vehicles turned out in 1909 being 76,114, representing a value of $113,403,188, as compared with a production of 7,220 cars valued at $11,781,521 in 1904. These machines constituted 60.1 per cent. of the total number and 69 per cent. of the total value of automobiles manufactured in 1909.

Runabouts stand second as a class, the production for that year comprising 36,204 cars with a value of $28,030,479. These figures appear very favorably when compared with the 12,131 runabouts built in 1904 which represented a value of only $8,831,504. Of all the varieties of pleasure and family vehicles, including motor buggies, limousines, cabs, surreys, victorias, etc., there were manufactured 9,550 during the year 1909, representing a value of $14,387,664.

In the production of touring cars and runabouts Michigan was the leading state, building 45.3 per cent. and 47.8 per cent. respectively of the total value of such machines. In 1904 Michigan reported 20.4 per cent. of the total value of touring cars, being exceeded in the value of this class of vehicles by Ohio, which reported 42.2 per cent. of the total. In the value of runabouts, however, Michigan led in 1904 with 45.9 per cent., Indiana ranking second, while Ohio stood second in the value of touring cars produced. In the manufacture of other types of vehicles, Ohio stood first, reporting 37.4 per cent. of their total value in that year. In 1904 Indiana stood first in this respect, building 45.8 per cent. of the total value of these cars produced.

In the number of delivery wagons built in 1909 Michigan was surpassed by Ohio and Illinois in respect to number and by Illinois and Pennsylvania in value.

New York reported the largest number of motor trucks in 1909, but the aggregate value was less than that reported by Michigan. This is interesting in view of the fact that in 1904 New York led both in the number and value of such vehicles, having 71.1 per cent. of the value. New York led in the value of "all other varieties" of business vehicles in 1909, reporting 30.3 per cent. of the total. In 1904 Connecticut was the leading state in respect with 40.6 per cent.

All the states for which comparative figures are given in the table show large relative increases in the total number and value of automobiles manufactured, except for the fact that Massachusetts reported a smaller number and value for runabouts in 1909 than in 1904, while for the miscellaneous class of business vehicles Connecticut reported a smaller number and value and Massachusetts a smaller number in 1909 than in 1904.

More than nine-tenths of the automobiles manufactured in 1909 by the establishments engaged in the industry had motors of from 10 to 49 horsepower, 40.5 per cent. of the total number being rated at from 30 to 49 horsepower, 27.9 per cent. at from 20 to 29 horsepower and 23.2 per cent. at from 10 to 19 horsepower. Only 6 per cent. of the total number were rated at less than 10, and only 2.5 per cent. at more than 50 horsepower.

Of the passenger automobiles turned out by the factories of the industry in 1909, touring cars constituted 61.7 per cent., while runabouts were 29.4 per cent. The majority of the runabouts, of course, were low-powered machines, 78.7 per cent. being rated at from 10 to 29 horsepower. Naturally, almost all the high-powered cars were of the touring class. More than nine-tenths of these were rated at over 20 horsepower, 60.3 per cent. of the total being from 30 to 49 horsepower and 28.6 per cent. at from 20 to 29 horsepower.

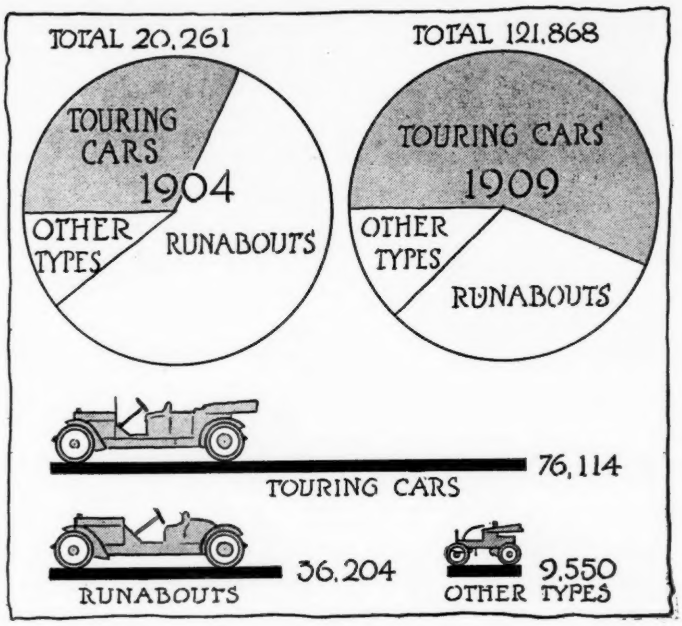
At the census of 1899 the manufacture of automobiles, bodies and parts was reported as a part of the carriage and wagon industry, but the returns of establishments engaged exclusively or primarily in the manufacture of automobiles have since been tabulated separately and are presented in the comparative table published herewith as the statistics of the industry for 1899. The totals for that year do not include statistics for establishments whose chief products were automobile bodies and parts, but it is doubtful whether there were any such establishments at that time, as the industry was then to a large extent in an experimental stage. Consequently, the comparison of the figures for 1899 with the results of the two later censuses is of no great value.

NUMBER AND VALUE OF THE SEVERAL TYPES OF AUTOMOBILES IN 1909

Class and State	NUMBER		VALUE	
	1909	1904	1909	1904
All classes	126,593	21,692	$164,269,324	$23,751,234
Pleasure and family vehicles	121,868	20,261	155,821,331	21,651,331
Touring cars	76,114	7,220	113,403,188	11,781,521
Connecticut	2,165	292	5,613,262	1,008,383
Illino s	2,059	52	2,746,214	75,838
Indiana	6,838	387	10,710,289	736,869
Massachusetts	2,063	361	4,673,171	692,439
Michigan	43,855	2,561	51,365,984	2,402,125
New York	5,440	397	12,296,292	995,982
Ohio	6,479	2,521	14,307,360	4,967,731
Runabouts	36,204	12,131	28,030,479	8,831,504
Connecticut	393	209	815,888	283,800
Illinois	433	54	292,908	35,800
Indiana	8,139	230	5,055,208	173,084
Massachusetts	983	1,153	654,838	816,844
Michigan	18,173	6,432	13,399,937	4,057,439
New York	1,097	1,082	1,539,659	1,163,554
Ohio	2,900	186	2,948,588	124,629
All other varieties	9,550	910	14,387,664	1,038,306
Illinois	470	47	969,580	70,297
Indiana	2,104	372	1,445,357	476,050
Michigan	1,855	30	3,990,988	21,600
New York	507	60	1,480,735	79,600
Ohio	4,114	100	5,374,914	100,000
Pennsylvania	67	51	80,805	73,300
Business vehicles	4,725	1,431	8,447,993	2,099,903
Delivery wagons	1,862	251	1,918,856	455,457
Illinois	447	......	406,410	....
Indiana	107	18	157,358	20,160
Michigan	401	51	319,071	35,250
New York	139	77	282,989	191,457
Ohio	469	......	242,105	....
Pennsylvania	242	......	406,325	....
Trucks	1,366	160	3,165,512	491,490
Illinois	28	......	46,955	....
Indiana	43	......	109,492	....
Michigan	372	51	994,311	36,390
New York	475	81	889,724	349,500
Ohio	202	1	386,945	5,000
All other varieties	1,497	1,020	3,363,625	1,152,956
Connecticut	119	164	259,028	468,400
Indiana	22	13	127,232	22,300
Massachusetts	280	673	509,646	269,200
Michigan	144	......	289,458	....
New York	406	111	1,020,183	291,000
Ohio	135	......	290,200	....
Pennsylvania	127	5	323,026	13,300

The branch of the industry devoted to the manufacture of bodies and parts greatly exceeded the large relative increases shown for the period from 1904 to 1909 by the establishments which reported automobiles as the chief product. For example, the number of wage earners employed in the automobile manufacturing plants was five times as great in 1909 as in 1904, while the average number employed in the bodies-and-parts-making plants was more than thirteen times as great as at the time of the latter census. Also, in 1909 the value of the automobiles turned out, while showing a tremendous increase in being over seven times as great as in 1904, is overshadowed by the figures for the division of the industry making bodies and parts which show that this group of establishments had increased the value of their product in 1909 to more than sixteen times that shown in 1904.

In 1909 there were 85,359 persons engaged in the industry, of whom 75,721, or 88.7 per cent., were wage earners, 2,564, or 3 per cent., proprietors and officials, and 7,074, or 8.3 per cent., clerks. Of the total 82,918, or 97.1 per cent., were males, and 2,441 or 2.9 per cent. females. The average number of children under 16 years of age employed as wage earners in the industry in 1909 was 162, of whom 159 were males and three females. An excellent idea of the average number of wage earners may be obtained from the table at the bottom of this page which gives the figures for 1899 and 1904 as well as for 1909. The largest number of wage earners employed in the whole industry in any month of 1909 was 89,886 in December and the smallest number 62,724, this figure representing 69.8 per cent. of the figure for December.



Circular diagrams show the proportion of the various types of automobile manufactured in 1904 and 1909. Below, division of 1909 production into types

COMPARATIVE TABLE SHOWING CONDITIONS IN THE AUTOMOBILE INDUSTRY IN 1899, 1904 AND 1909

State	Census	Number of Establishments	Persons Engaged in Industry: Total	Proprietors and Firm Members	Salaried Employees	Wage Earners (Average Number)	Primary Horse-power	Captial	Salaries	Wages	Cost of Materials	Value of Products	Value Added by Manufacture (Value of Products Less Cost of Materials)
								Expressed in Thousands					
United States	**1909**	**743**	**85,359**	**405**	**9,233**	**75,721**	**75,550**	**$173,837**	**$9,479**	**$48,694**	**$131,646**	**$249,202**	**$117,556**
	1904	**178**	**13,333**	**103**	**1,181**	**12,049**	**10,109**	**23,084**	**1,257**	**7,159**	**13,151**	**30,034**	**16,883**
	1899	**57**	......	......	**268**	**2,241**	......	**5,769**	**295**	**1,321**	**1,804**	**4,748**	**2,944**
California	1909	41	589	50	61	478	305	701	71	368	700	1,470	770
	1904	6	21	4	3	14	32	49	5	10	13	36	23
Connecticut	1909	28	4,444	8	621	3,815	3,937	12,131	634	2,878	4,856	11,668	6,812
	1904	a7	1,131	4	62	1,065	1,283	3,713	86	784	1,163	2,644	1,481
Illinois	1909	65	2,804	41	381	2,382	1,786	4,084	426	1,653	3,979	7,154	3,175
	1904	12	192	8	17	167	136	401	28	107	112	357	245
	1899	4	......	......	36	303	......	975	28	218	292	748	456
Indiana	1909	67	7,753	36	920	6,797	5,813	16,722	870	4,131	14,995	23,764	8,769
	1904	11	921	6	99	816	760	1,194	80	496	824	1,639	815
Massachusetts	1909	62	4,624	38	448	4,138	2,896	7,458	497	2,793	5,491	11,359	5,868
	1904	18	1,229	15	114	1,100	909	1,939	128	709	1,268	2,663	1,395
	1899	12	......	......	18	303	......	476	24	188	307	769	462
Michigan	1909	113	28,098	29	2,625	25,444	25,938	52,926	2,570	15,491	53,882	96,651	42,769
	1904	33	2,953	17	201	2,735	1,800	4,347	236	1,268	3,443	7,997	4,554
Missouri	1909	17	449	6	75	368	184	800	85	252	1,025	1,677	652
	1904	a3	37	3	13	21	20	24	5	16	31	63	32
New Jersey	1909	24	1,159	8	127	1,024	1,311	2,703	160	615	892	2,008	1,116
	1904	x5	83	1	22	60	367	310	14	40	44	119	75
	1899	4	......	......	35	201	......	763	54	144	176	479	303
New York	1909	113	11,610	59	1,690	9,861	9,398	25,102	1,604	7,016	14,908	30,980	16,072
	1904	35	2,101	21	231	1,849	1,254	3,347	231	1,227	1,907	4,260	2,353
	1899	15	......	......	56	288	......	639	57	166	173	456	283
Ohio	1909	75	13,458	42	1,286	12,130	14,433	30,892	1,430	7,746	18,522	38,839	20,317
	1904	22	2,939	8	209	2,722	1,877	4,226	254	1,617	2,553	6,358	3,805
	1899	3	......	......	7	86	......	68	5	52	60	145	85
Pennsylvania	1909	44	3,566	29	338	3,199	2,746	6,971	384	1,808	4,051	6,532	2,481
	1904	6	631	......	65	566	423	1,453	79	352	601	1,226	625
	1899	8	......	......	16	60	......	297	18	43	31	99	68
Wisconsin	1909	30	4,647	18	331	4,298	3,153	8,746	443	2,733	5,340	11,440	6,100
	1904	x6	587	8	59	520	645	1,240	54	300	845	1,875	1,030
All other states	1909	64	2,158	41	330	1,787	3,650	4,601	305	1,210	3,005	5,660	2,655
	1904	14	508	8	86	414	603	841	57	233	347	797	450
	1899	11	......	......	100	1,000	......	2,551	109	510	765	2,052	1,287

aExcluding statistics for one establishment, to avoid disclosure of individual operations.
xExcluding statistics for two establishments, to avoid disclosure of individual operations.

Alco Discontinues Automobile and Truck Department

Annual Loss on All Vehicles Sold Apparent Reason—Factories, Branches and Agencies To Be Closed—Long Island Service Station To Be Continued To Supply Parts

One Reason for the Failure of the Company in the Automobile and Motor Truck Field Its Apparent Attempt To Conduct These Departments Along Lines of Locomotive Manufacture and Sale—Present Machines on Hand To Be Disposed of at Cut Rates

NEW YORK CITY, Aug. 23.—The American Locomotive Co., builders of Alco touring cars and trucks, voted to discontinue its entire automobile business, at a meeting of its directors held on August 13. The passenger cars and trucks on hand are being disposed of at fire-sale prices, reductions of little more than one-half the list prices. Materials on hand in the big factory at Providence, R. I., will in the next 3 months be worked into complete vehicles, by which time it is hoped that all manufacturing will be completed.

All selling agency arrangements have been cancelled and the company's selling branches at New York, Boston, Philadelphia, Chicago and Montreal will be disposed of as soon as possible.

Spare Parts Available for Years To Come

The parent company, that is the American Locomotive Co., is the largest builder of railroad locomotives in the country and with its half-dozen big plants scattered throughout the east, has seen to it that every owner of an Alco truck or passenger car will be able to buy spare parts and get repair work done for years to come. The big service building in Long Island City, just across the river from New York, will be continued indefinitely and will be headquarters for Alco automobile supplies and repairs with C. Arthur Benjamin, present sales manager, in charge.

The action of the Board of Directors in so suddenly ending the motor car and truck business came like a flash of lightning out of a clear sky, because on February 10, 1913, Leigh Best, first vice-president of the locomotive company and in charge of finances, was placed in direct charge of the motor car department and at that time the announcement was made that henceforth the Alco would have a definite fixed policy so far as motor cars and trucks were concerned and that it would in a few years take a premier position in the field. Since then nothing was heard until last week when the announcement of entire discontinuance was made at the annual meeting of the company.

The announcement made by W. H. Marshall, president, was brief and as follows: "The Board of Directors of this company at a meeting held on August 13, 1913, decided to discontinue the manufacture and sale of automobiles and motor trucks. The company takes this opportunity to assure all owners of Alco vehicles that arrangements will be made to furnish them with repair parts for a period of not less than 5 years to come, and, further, that it will fulfill in every respect its obligations given under guarantee to its customers."

The undoubted reason for this action lies in the fact that the company has lost money on practically every passenger car, taxicab, and truck sold by it since 1906, when it entered the field. This loss was an annual story and each year at the annual meeting, held between August 15 and 30, the question was invariably asked "Shall we continue the automobile business or not for another year?" From those who have been close in touch with the affairs of the automobile department it is evident that of late these annual losses exceeded $500,000, due largely to poor production methods, and general uncertainty regarding the policy to be followed from one year to another. The engineering, selling and advertising departments rarely knew before the annual meeting at the close of August what policy and program they could carry out for the following year, whereas at this date rival companies had their models for the following year on the market and well advertised. Such delays and failure to rationally comprehend the tides and times of the motor industry, would make any company a signal failure. Advertising appropriations that were asked for in June were not forthcoming until the end of October or early in November.

Always Far Behind in Its Schedule

Being impossibly late in getting its production, selling and advertising departments at work on the new models made it certain that the annual output would rarely if ever be sold, and although the car program called for 250 vehicles annually, there was never any reduction in this number no matter how late the policy for the year was decided upon, the result being that the following July or August found the company with 25 to 150 unsold passenger cars on hand at a time when other companies were marketing their models for a succeeding year. In such a situation there were but two policies to follow: First, cut the price and so demoralize matters in general; and second, work these models over and carry them along as new types for the following year. The second policy was often followed, and it proved a most expensive matter. These held-over models were dismantled and changes in chassis and bodies made, changes which added enormously to the price, so that when finally disposed of they were marketed at a great loss. Taxicabs were sold at $2,100 which showed a factory cost of labor, time and materials of $2,600. Added to this loss of $500 per vehicle was that of selling, advertising, overhead, etc. Four-cylinder cars that were said to show a factory cost for time, material, and labor of $3,700 were sold at $3,600. These losses were directly due to too late determining of policies and poor production methods.

Last year, 1912, the company's business was 85 per cent. trucks and 15 per cent. touring cars. This season, 1913, 250 passenger cars were built and materials bought for 1,000 trucks, of which from 600 to 800 have been completed. There is now on hand

material for approximately 400 trucks, but very few passenger cars as the engineering department was planning a great many changes in this department of the company's manufacture.

New Program for 1914 Already Planned

For 1914 the company had planned an entire new program for the passenger car field. Early last spring it contracted with Henry M. Crane, engineer of Bayonne, N. J., to develop a light six-cylinder car which was to be marketed for 1914 and all of the present high-priced, high-powered models discontinued. The first three cars of this new model have been on the road for some time, and they must represent an investment of $25,000 to $40,000. This fact alone is significant in view of the vote on August 13 to discontinue, which vote must have been little considered previous to the meeting. This new model has six cylinders, 4 by 5 inches, L-head, and cast in cylinder groups of threes. As a five-passenger touring car it was the best to list at $3,400. While made in but one model it was to be built in three chassis lengths to accommodate different bodies. But, like the general policy of the company in its automobile department, this new model came too late. Two years ago it would have been a winner, a money maker with Alco finances and the enterprising advertising and selling methods used at that time by the company.

A cursory investigation shows that there were many other methods connected with the automobile department of the company that spelled certain failure, and that, while its locomotive department was conducted along regular lines, the hesitation in the automobile end made success impossible. Production was poor. There were fifty-seven different models in 7 years, an average of over eight different models in the same factory each year, and to make matters worse some of these were taxicabs, some passenger cars and the majority trucks. With such a program, economic production was impossible. At one time when six different models were coming through there were six different motor sizes: A taxicab, a four-cylinder car, a big six, a 3-ton truck, a 2-ton truck, and a new design of 3-tonner.

Added to this impossible multiplicity of models was that of failure to standardize among these different ones. The company built its own steering columns and parts and built a different one for each model including two truck types.

The company built its passenger car rear axles, a combination stationary and live type of most excellent design, but enormous cost. The special machine for making the stationary part cost $58,000 yet was only needed to produce 250 annually. Had the company built axles for other concerns, which it would not do, this expensive equipment might have been converted from a loss to a profitable investment.

The purchasing department was not infrequently open to censure in that it over-bought. The engineering, sales and advertising departments would recommend an output of 800, and the purchasing department would buy for 1,600 vehicles. The buying was all done at once instead of being spread over a definite period. From some of the older employees connected with the factory come tales of finding 2,700 pieces for models of which not more than ten or twelve were made. In the factory machines were found manufacturing parts for 2 weeks after such parts had been altered or discontinued. In some of its truck models one-half the parts were made in metric sizes and the other half in inch dimensions, a particularly difficult manufacturing job.

Began by Making American Berliet

The history of the Alco car dates to 1906 when the American Locomotive Co. purchased the rights to build the Berliet of Lyons, France, in America on a royalty basis. The manufacture was carried on at Providence, R. I., in a remodeled locomotive plant which the company had on its hands. After 3 years the royalty agreement was discontinued and the company brought out its own line of cars and introduced the name Alco. Soon after this the truck business was started.

The American Locomotive Co. is a $50,000,000 corporation and had $6,000,000 invested in the automobile department. The Long Island service building is valued at $120,000 with parts at $125,000. The Chicago branch has a valuation of $112,000, a stock of $175,000 in parts is carried on the Pacific coast. The Philadelphia and Boston branches were rented properties.

Cars Permitted in Yosemite National Park

WASHINGTON, D. C., Aug. 23—The Secretary of the Interior today instructed Maj. Wm. T. Littebrant, acting superintendent of the Yosemite National Park, to open the Coulterville road to automobile tourist travel. The road is to be opened to the public generally and not to any particular machine or concern.

Automobilists all over the country who contemplate a tour to the park will receive this announcement with rejoicing as formerly no cars were allowed within its borders.

The department has prepared a set of regulations governing the movement of cars in the park. They provide that machines will be permitted to enter and leave the park by way of the Coulterville and Big Oak Flat roads only; approaching Yosemite Valley, they will be restricted to the road on the north bank of the Merced River. The use of the roads mentioned is allowed only for the purpose of ingress and egress. Cars coming into the park may leave the Merced Grove of Big Trees between 10 A. M. and 1 P. M. and between 4 P. M. and 5.30 P. M. Outward-bound cars must leave Yosemite Village between 6 and 7.30 in the morning. Machines are restricted to a speed of approximately 10 miles an hour in the rolling mountain country, to 5 miles per hour on the steep descent to the foot of the Coulterville road, to 15 miles per hour between the old blacksmith shop and Cascade Creek, to 10 miles per hour between Cascade Creek and Pohono Bridge and to 15 miles per hour between Pohono Bridge and Yosemite station.

Speed Limit Is Provided

East bound, no car will be permitted to cover the distance from Merced Grove to Cascade Creek in less than 1 hour and 17 minutes, or from Cascade Creek to Yosemite Village in less than 37 minutes, making the minimum time of passage from Merced Grove to Yosemite Village 1 hour and 54 minutes. West bound, no car will be permitted to cover the distance from Yosemite station to Cascade Creek in less than 35 minutes, or from Cascade Creek to Merced Grove in less than 1 hour and 16 minutes, making the minimum time from Yosemite to Merced Grove 1 hour and 57 minutes.

On entering the park at the Merced Grove, each car will be given a ticket of passage, on which will be stamped the time of starting from the Merced Grove. This ticket must be shown to the ranger at Cascade Creek, who will stamp on it the time the car passed his station. The ticket will again be stamped with the time of arrival at Yosemite Village. Similar procedure will be observed with reference to cars bound out of the valley. If the time stamped shows that the car has exceeded the maximum speed, the offender will be obliged to park his machine immediately and leave the reservation at the next regular time set for the passage of motor cars. A license fee of $5 must be paid for the round trip. No motorcycles will be allowed.

New Fall Series of Reo the Fifth Out

NEW YORK CITY, Aug. 25—The Reo Motor Car Co., Lansing, Mich., is putting out a new fall series of the Reo the Fifth 30-horsepower touring car and roadster, which carries with it a reduction of $220 from the former price. Every feature is to be retained, while many timely improvements and refinements are added. The touring car and roadster are both fully equipped with electric starter, electric generator, electric lights, electric horn, speedometer, mohair top, curtains, envelope, extra demountable rim, including a standard equipment of tools and accessories.

The body is of new design—snappy, rakish and low hung with cowl dash and gondola back. The instrument board, with all instruments set flush, is placed within reach of the driver. The windshield, of new and special design, is ventilating, clear vision and rain vision. The electric searchlights have a dimming attachment. The new style tire carrier on the back holds the tail light and number tag so as to comply with all laws. The transmission has been changed in ways which make for utter silence and maximum efficiency.

The wheels are 34-inch with demountable rims; tires 34 by 4 front and rear, which afford ample capacity. The one-rod Reo control, by which all connecting links and outside levers are eliminated, is retained. Both brakes are operated by pedals, thus making the driver's entrance from either side clear. Fifteen roller bearings and 190 drop forgings are used.

Pulling Missouri Out of the Mud

An Army of 250,000, Led by Two Governors, Devotes 2 Days to Improvement of Highways and Doing Over $1,500,000 Worth of Work at a Total Cost of Less Than $5,000 To the State Treasury

A typical scene on a Missouri road during the recent 2-day campaign

ST. LOUIS, MO., Aug. 23.—After 2 days of hard labor, Missouri has been dragged out of the mud, "Drag Missouri Out of the Mud" was the slogan, and 250,000 men, it is estimated, answered Governor Elliott W. Major's proclamation, designating Wednesday and Thursday as "Good Road Days."

From all parts of the state come reports of the labors of citizens dragging, digging, building and shoveling in an effort to give Missouri a chance with other states in the grind to perfect its roads. The volunteer army, which was composed of convicts, business men and state officials, from the humblest sheriff to the governor, did work which it has been estimated that would have cost the state, had it been paid for, more than $1,000,000.

Women Aided in Many Ways

The women of the state too aided in the great work, and in some sections the ladies were not satisfied with serving lunches and dinners, and donned their aprons to handle a pick or shovel.

At daybreak yesterday morning, a mighty army of patriotic men, recruited from stores, offices and farms and serving without pay, moved out upon the highways of the state and gave battle to the narrow and bumpy dirt roads, the steep grades and antique culverts and bridges. All through the scorching day they fought, minister and bartender, banker and town loafer, judge and blacksmith, shoulder to shoulder; a most striking exhibition of practical democracy and civic patriotism with the pick, the spade and the hoe emblems of liberty, equality and fraternity.

A night's armistice was declared at sundown but the soldiers of Missouri's good roads' legions had just begun to fight. Early this morning the battle was resumed with renewed vigor and enthusiasm. Hundreds of raw recruits joined the ranks of the 1-day veterans. Spartans who toiled on despite lame backs and swollen hands. Blasting was heard all along the line from Athens to Southwest City, from Watson to Douglas and in the 110 counties of the state, at least one-fourteenth of Missouri's entire population perspired and shovelled in a broiling sun that the disgrace of the commonwealth might be mitigated.

The army disbanded tonight. It was victorious. At Jefferson City, the state capital, Governor Elliott W. Major estimated the value of the road improvements at $1,500,000. The cost was ridiculously low. The expense of the 2-day campaign will not exceed $5,000.

The water bucket was a welcome visitor to the volunteer workers

But figures alone are inadequate to show the results of the greatest of all good roads' campaigns. Missouri has solved a problem for a nation. Other states will follow her example. Arkansas has set aside September 2 and 3 as good roads' days. Governor George N. Hodges of Kansas, who journeyed across the state line to be "shown," has returned to the haven of grasshoppers to call for volunteers and proclaim two good roads' days. Flushed with its success and already planning for 1914, Missouri prophecies that the movement will be national next year and that the residents of forty-eight states, instead of one, will shoulder spade and pick in a 2-day battle for highway improvements.

Good Roads Spirit Roused

"A good roads spirit has been kindled in Missouri which will bring rich fruitage for many years," said Governor Major tonight. "The road days have been such a splendid success that I expect to set aside the same days in 1914 and will call upon the governor of each state to do the same. These things will be potent factors in inducing the federal government to appropriate a goodly sum to aid the states in building highways."

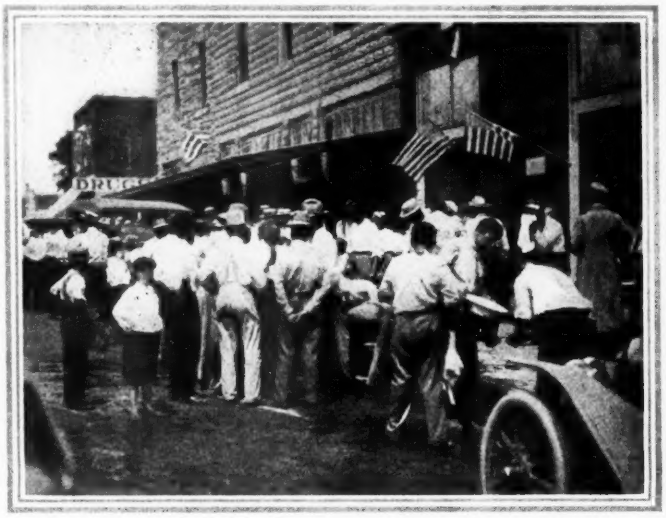
Comparing the wretched highways of Tuesday with the improved roads of Thursday, you doubt if pigmy man could ac-

complish such a change. It seems as though a magician had waved his wand or a Hercules had been reborn to accomplish his eleventh labor. State-wide organization perfected, 250,000 volunteers recruited and $500,000 in materials and money subscribed in a single month! Improvements on 500 miles of highways at an estimated value of $1,500,000 made in 2 fleeting days! No wonder an astounded nation rubs its eyes and exclaims," "Almost incredible!" But Missouri has proofs of its colossal accomplishment; proofs that wind in and out through the hills and over the fertile lowlands, proofs that bring the farmer closer to the city and invite the motorist to drive over trails once trod by the pioneers—Boone and Lewis, Carson and Fremont.

D. A. R. Gave Rise to Movement

The spark that became a flame and fired 250,000 men to action yesterday and today was struck but a short time ago by the Missouri Daughters of the Revolution who took the initiative in the good roads work by marking that part of the historic Santa Fé trail which crosses the Missouri river at Arrow Rock and passes westward through Grand Pass, Lexington and Independence to Kansas City.

In the presidential election of last November, Missouri switched its allegiance from the Republican to the Democratic party, repudiated Hadley and elected Elliott W. Major as governor. The voters chose a man of action, an executive who realized the economic and social importance of good roads. Seven months after his inauguration, Governor Major called upon the citizens of the state to cooperate with him in his campaign for improved highways. The response was more than gratifying. It was almost unanimous. Led by the Kansas City Star, a most influential Missouri newspaper, the press started educational work and advised its readers to enlist in the good roads army.


A country town's hospitality to the volunteer workers; washing up for a big chicken dinner

Commercial organizations were prompt to respond. Subscription lists were circulated and money collected for the purpose of road materials and tools. One Kansas City mercantile house donated $5,000 worth of spades and picks. Manufacturers of road machinery and gasoline tractors supplied the scrapers, drags, rollers and graders. Makers of explosives opened the doors of their powder houses and told the county highway supervisors that they might forage for dynamite without fear of molestation. Bags of cement also were put on the free list.

Merchants and professional men, who could not work on the roads because of press of business, subscribed $4 each for the hire of substitutes. Over $2,000 was contributed for this purpose by members of the Kansas City Commercial Club. From Kansas City business men, now touring in Europe, cabled $16 from Paris that they might claim some of the glory in the great achievement. Scores of former residents of Missouri sent money to aid the good roads cause in the state of their birth.

Private motorists, the motor clubs of the state and motor car dealers furnished the machines that transported the volunteers to the field of action. Forty cars, donated by the Kansas City Automobile Dealers Association, were put at the disposal of the Jackson county road workers. Hundreds of motor trucks, owned by manufacturing and large commercial establishments, were taken off freight runs and sent out into the country to haul crushed stone, cement and tools.

Commissary Department Efficient

Not all the volunteers were men. Hundreds of women, society leaders of the cities and rural belles and housewives, went to the front and formed a commissary department of which a European war lord would be envious. No army was better fed than the good roads' legions of Missouri. Fried chicken was served by the barrel load. Boiled ham was another entrée. Hogsheads of ice tea, lemonade and water were put on the firing line, so near the workers that no "limpin' lump of brick-dust, Gunga Din" was needed. Green corn, whole quarter-sections must have been ravaged to supply the demand of the hungry toilers. And the same splendid organization that marked the shovelling and grading was prominent in the commissary department. The State Federation of Women's Clubs and the Daughters of the American Revolution were leaders in this work.

The farmer's wife perspired over a hot range while her husband and sons sweated on the road and her small daughters formed a water-carrying brigade.


R. W. McCurdy, Jackson County road boss, exhorting the country townspeople to greater efforts


Making a good road out of a cross country lane

Holley Uses System in Storing Patterns

Steel Cabinets with Numbered Shelves Provide Quickly Accessible Method of Keeping Carbureter Patterns in Foundry

A FACTOR of extreme importance in the efficient working of a foundry is the accessibility of the patterns. Where no system of pattern storage is followed, as is often the case in some of the older foundries a great deal of time is lost in hunting up particular patterns when wanted, all of which time could be saved if some thought had been given to the matter of convenient arrangement in the first place.

In a factory producing large and regular quantities of small cast parts of standard form the necessity of some accessible method of pattern storage is so obvious that the idea of systematic arrangement naturally suggests itself. Yet, although this is the case there is still ample opportunity for the development of the idea to meet individual needs. A case in point, containing many features of excellence, is the system in use in the foundry of the Holley Carbureter Co., Detroit, where the accompanying sketches were made.

Before proceeding with the storage system itself it may be of interest to consider the particular kind of patterns for which this system was designed.

Since all the parts which go to make a carbureter are much too small for individual molding, the gate method of casting in multiple is followed throughout. This will be made clear by reference to Fig. 1 which shows at the left a gate pattern for elbows by which twenty-four of these small parts are cast in a single pouring of the metal. This is the method adopted for all solid parts, that is, all pieces containing no holes or holes that require no cores. In use this pattern is simply placed between two flasks full of molding sand and when removed the space so formed, filled with the molten metal, producing a piece exactly similar to the pattern. From this the elbows themselves are cut, the central gate and runners going back to the furnace.

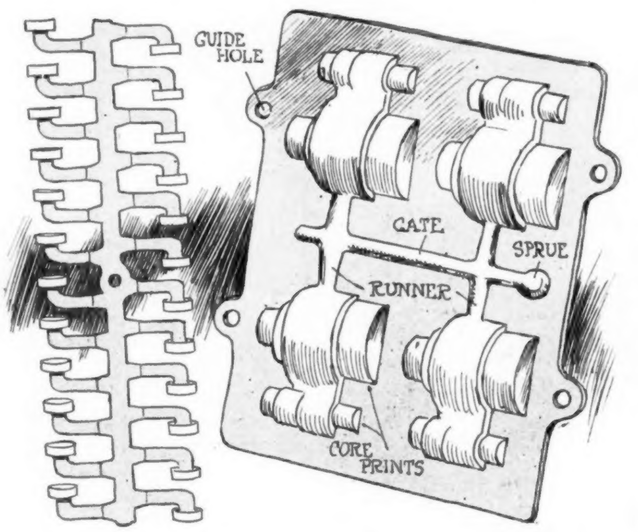


Fig. 1—Left, gate pattern for twenty-four elbows. Right, plate pattern for casting four mixing chambers simultaneously

Standard Plate Patterns Used

The plate method of mounting the patterns is shown on the right in the same illustration. This is used where the parts to be cast contain holes that necessitate the introduction of cores in the final mold. The plate shown measures 12 inches by 17 inches and agrees with the standard size of flask used in the Holley foundry. It will be noticed that it is large enough to take four mixing chambers, the largest part used in the carbureter. The pattern itself is of solid brass, cut in two on the center line and the halves so formed fixed to each side of the plate exactly opposite each other.

When casting from this pattern the plate is inserted between the two flasks, the latter filled with sand and the whole then subjected to great pressure. On removing the plate a space corresponding to the outer shape of the mixing chamber remains. Before pouring in the metal at the sprue indicated in the sketch, baked cores of sand representing the interior spaces of the part are introduced between the two molding faces. This leaves a concentric space in direct communication with the channeled impression formed by the gate and the runners along which the metal flows. The four mixing chambers thus produced are sheared from the gate, the core sand is shaken out, and they are then ready to pass into the machining departments.

It will be seen, therefore, that there are two standard types of pattern constituting the bulk of the patterns in most frequent use, which are to be reckoned with as the important factors governing the space and methods of the necessary storage. The great convenience and at the same time the compactness of the system in the Holley factory of storing the plate patterns are shown at the left in Fig. 3. All-steel racks, 7 feet high, in bays of a width corresponding to the standard width of the plate extend along one wall of the pattern room. Each bay is provided with a number of angle iron slides spaced 2 or 3 inches apart forming supports for the plates which can thus be withdrawn or replaced without trouble and without disturbing the other patterns. The depth of the rack or cabinet, is equal to the length of the plate, that is, 17 inches, a comparatively narrow slice of the floor space when the number of patterns for which storing space is provided is taken into consideration.

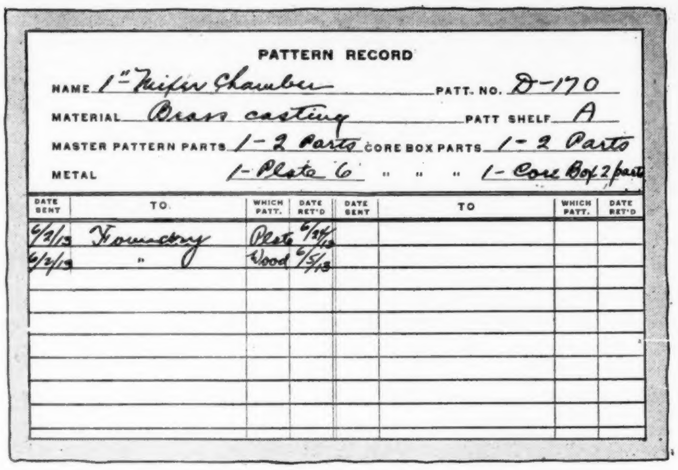
Every Shelf Is Numbered

As regards the finding of particular patterns when wanted this is rendered an extremely simple matter by a system of indexing, first by each bay and then by individual numbers for the plates. A strip of iron passing along the top of the rack forms the surface on which the numbers referring to each bay are painted in black on a white ground. Similar strips are attached vertically to the front of the rack at the junction of every other bay and on each side of these, numbers corresponding to the adjacent plates are painted in clear figures.

The gate patterns, by reason of their shape present a much simpler problem as far as storage is concerned. A framework consisting of horizontal strips of wood is attached directly to another of the pattern room walls. These strips are spaced about 18 inches apart, this being a little over the standard length adopted for all gates irrespective of the number of parts to a gate. A couple of nails driven in at intervals of a few inches along the racks as shown in the upper center sketch, Fig. 3 are all that is necessary to act as a support for the pieces, which are arranged as far as possible in order of the

parts required for each particular model. That is to say, where possible, all the patterns belonging to a certain model of carbureter are brought together so as to facilitate the issue of patterns as each order is put through. This same rule is followed in the case of the plate patterns also, though there are inevitable deviations from it, as for instance, where certain cast parts are applicable to several different sizes of carbureter.

The gate patterns are indexed, each by a number stamped on the gate itself. No corresponding number is placed on the rack but they are kept in strict numerical order nevertheless. An obvious advantage of this method of keeping the patterns, besides the fact that there is scarcely any encroachment on the floor space is that all the parts are entirely exposed so that familiar ones can be found even without recourse to the index numbers.



PATTERN RECORD

NAME 1" Mixer Chamber PATT. NO. D-170

MATERIAL Brass casting PATT SHELF A

MASTER PATTERN PARTS 1-2 Parts CORE BOX PARTS 1-2 Parts

METAL 1-Plate 6 " " " 1-Core Box 2 parts

DATE SENT	TO	WHICH PATT.	DATE RET'D	DATE SENT	TO	WHICH PATT.	DATE RET'D
6/2/13	Foundry	Plate	6/24/13				
6/2/13	"	Wood	6/5/13				

Fig. 2—Card by which record is kept of each pattern

Core Boxes Stored Near Ovens

As essential to the economical running of the foundry as the accessible storage of the stock patterns described, is the keeping of the core boxes. At least one, and often several of these are required for every plate pattern used, so that any difficulty or time lost in finding particular core boxes would cancel whatever excellence, from the point of view of ready accessibilty, the system of keeping the plate patterns possessed.

In the Holley foundry the core boxes are stored on shelves in the cage shown to the right of Fig. 3. This is made of angle iron uprights and cross members covered with wire screen, with a door at one end provided with lock and key. It is situated in the oven room right next the core makers' benches so that no time is lost in transferring the core boxes. By fitting a lock to this cage a strict account of all core boxes issued to each order number can be kept by the man on whom this duty rests. It is impossible for a coremaker to take out a core box without a record being first made.

All the patterns dealt with above are those in fairly constant use. In addition, there is a considerable number of lesser used patterns and those for special orders. These are kept loosely in metal trays, in a cabinet the construction of which is indicated in the center of Fig. 3. This cabinet measures 6 feet high by 2 feet 6 inches wide and is provided with adjustable shelves on angle iron slides for the accommodation of the trays. The drawing number or order number of the carbureter or other device for which the several patterns contained in the tray, apply, is painted on the front edge.

It will be noticed that since the patterns are metal as well as the racks and cabinets the whole system is practically fireproof. The use of metal patterns has another great advantage and is in fact a necessity where large production is the rule. To begin with the making of a new pattern is an expensive operation, and by casting another pattern from the wood master-pattern which latter is used only for this purpose, clean castings are always obtainable as it is an easy matter to renew the metal pattern. The original or master patterns are stored in trays in a distant part of the factory so that in the event of fire, one or the other of the patterns is likely to be available for future use without the need for more work on the part of the pattern maker or hitch in the production of the foundry.

In the issue of patterns to the foundry a card index system is used. One of the cards, which measure 6 by 4 inches, is shown in Fig. 2. At the top, the name of the part, material in which it is to be cast, the pattern number and shelf on which it will be found, are entered. Besides this the card shows whether the cores are used and how many. The space below denotes where the pattern is and the date sent or returned, so that it is possible at any time by simply referring to the card to locate any pattern or core box.

All Repair Costs Are Recorded

Careful examination is made from time to time of all patterns to note whether repairs or new patterns are necessary. All repairs, alterations, and renewals are entered on the reverse side of the card, together with the name of the pattern maker and the cost of the repair.

In conclusion it may be stated as further evidence of the value of a simple system of pattern storage such as that described that no special knowledge is required on the part of the men using it. It is so simple that a new man needs scarcely any instruction in following it.

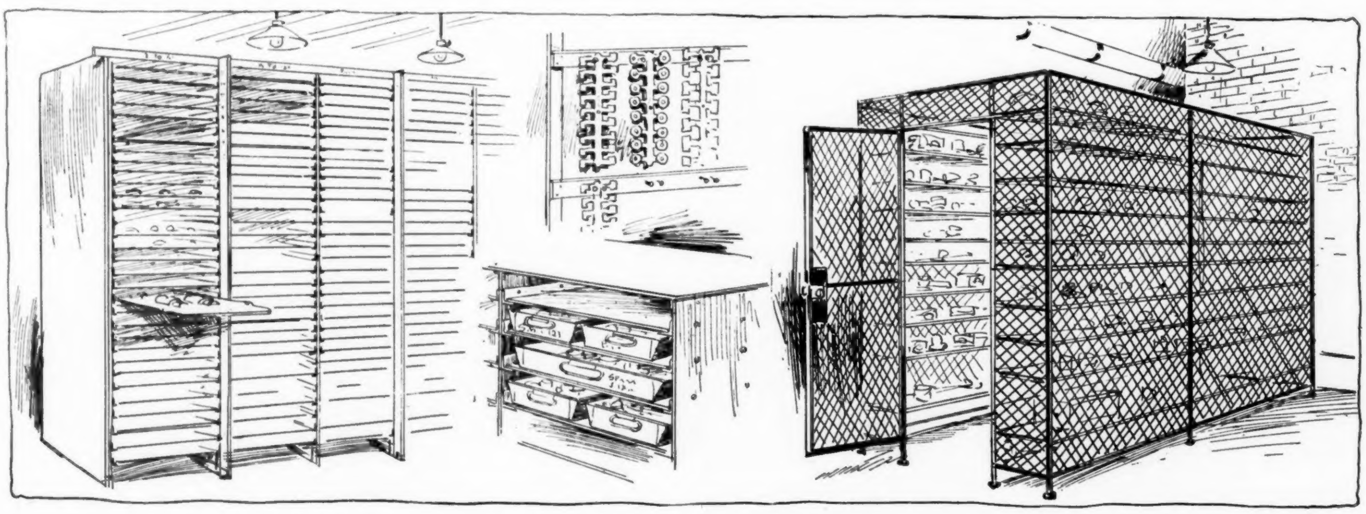
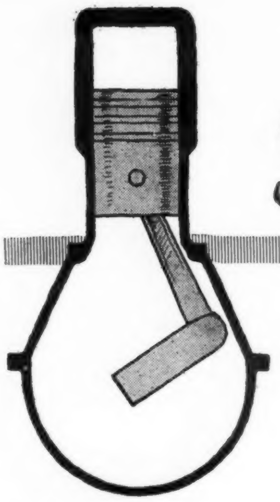
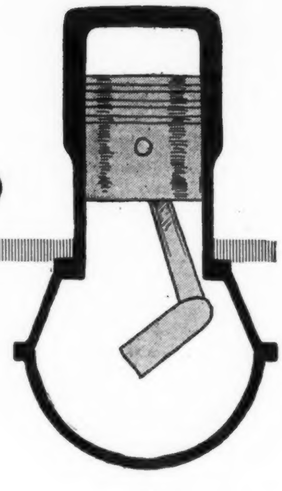


Fig. 3—Showing pattern storage in cabinet, rack and tray, and shelved cage in which core boxes are kept



Most Efficient Stroke-Bore Ratio



Exposed Wall a Big Factor in the Thermal Efficiency Because of Influence on the Amount of Heat Lost in Cooling Water

By E. P. Batzell—Part IV

IN THIS part Mr. Batzell takes up the important factor of wall area to volume ratio. The amount of exposed cylinder surface per unit of time directly affects the amount of heat lost through the cooling water. In the average engine it must be remembered that one-third of the total fuel value brought into the engine goes into the cooling water. The author continues:

It is a simple mathematical problem to calculate the cylinder proportions which afford the smallest wall surface including the two cylinder ends, per volume contained. This is made in the theoretical appendix, where it is established that the cylinder of relatively minimum surface should have a length equal to its diameter. The variation of the cooled cylinder surface with the piston travel elapses between the limits of the surface corresponding to the volume of the combustion chamber only, and the surface of the whole cylinder composed of the latter surface and that added through the total piston stroke.

Theoretically speaking, these two limiting amounts of surface are exposed to cooling for the longest duration, because at both moments the connecting rod passes through its dead centers and consequently the piston is stationary. The conditions are such, that during the first part of the motor stroke it is desirable from the standpoint of best efficiency to have the motor combustion chamber and the nearest to it space approximately as high as the diameter of the cylinder. On the other hand, to minimize the heat losses during the last part of the stroke, say near the moment of exhaust opening, it is best then to have the whole length of the cylinder equaling its diameter. The moment of exhaust opening is chosen because after it there is a rapid drop in the pressure and consequently in the temperature of the gases inside the cylinder, when there will be derived but little advantage from the minimized cylinder surface.

Long-Stroke Seems Best

With the above in mind, one will notice at a glance from the drawings Fig. 6, that the long-stroke motor seems to fulfill best the first requirement of a most efficient combustion chamber, but the short-stroke motor shows the smaller surface-to-volume ratio at the end of the piston's downward stroke. This fact indicates, that there must exist such a stroke-to-bore ratio for a given volume of cylinder content, when the most favorable distribution of the surfaces takes place. That will be at the moment of fulfillment of the condition, that the decrease of the heat losses near and through the combustion space walls by increasing the stroke-to-bore ratio, is offset by the simultaneous increase of these losses near the lower end of the piston travel.

It will also be readily seen that there can be no further gain in that part of the thermel efficiency of the motor which consists in the reduction of its cooling jacket heat losses, after a stroke-to-bore ratio is reached, when the height of the combustion chamber is equal to or somewhat smaller than the cylinder diameter. This limiting stroke-to-bore ratio for motors with a compression chamber volume of 25 per cent. of the total cylinder volume will be 3 to 1 or less, and for 20 per cent. compression space, it is increased to 4 to 1 or less. By the way, this indicates that with the increase of compression pressure the greater ratio becomes more advantageous.

For comparison of the motor sizes cited in former examples it will be assumed, that they all have a compression space volume of 25 per cent., respectively, equal to one-third of the piston displacement volume. The surfaces of the combustion chamber walls in these motors are as follows:

Size	3.57 x 7.14	surface 46.7 sq. in.
Size	4 x 5¾	surface 49.3 sq. in.
Size	4½ x 4½	surface 54 sq. in.

The total cylinder surfaces exposed at the end of the piston travel, these including the surface of the piston top, in the above order are: 126.7 square inches, 121.3 square inches and 117.6 square inches.

In Fig. 7 is reproduced a chart showing the variation of the cylinder surfaces of all three motors with their piston travel, that is the surfaces exposed by the piston, including that of the combustion chamber and the piston top, corresponding to every location of the piston in its travel. The symbols 1, 2, 3 are used to designate the motors in the order of the above table.

Heat Losses Proportional

In the same chart are included curves A and T, which represent the elapsing of the temperature of gases in the cylinder, the first curve corresponding to the theoretical adiabatic gas expansion inside the working cylinder, and the second curve being more like the actual one taking place with a non-instantaneous burning of the charge. Remembering, that the heat losses are proportional to the exposed surface, to the duration of the exposure and to the temperature difference between the gases and the walls, it would be possible to calculate these losses for all three motors using the information available from the curves in Fig. 7.

Thus one could obtain the data necessary to determine which of the above stroke-to-bore ratios is the best one in respect to the heat losses connected with it.

The above calculation is actually carried out in the theoretical appendix to this article. It is found that the jacket losses of the 3.57 inch and the 4.5 inch bore motors are practically alike. The gain of the former through its better shaped combustion chamber is offset by the increase of its losses at the end of the stroke over the losses of the large bore motor at the same time.

The 4 by 5¾ inch motor reveals a marked reduction of the total heat losses as compared with the other two sizes,

these losses being some per cents smaller under otherwise equal conditions, which fact is not in itself small enough to be neglected. Similarly like the above determination of losses during the expansion stroke of the motors one could determine their losses during the compression strokes.

The elapsing of the time, surfaces and temperatures being proportionately the same as for the expansion stroke, the rate of heat losses also will be the same. This amid other things should refute the existing belief, that the long-stroke motor can be built with a relatively higher compression, than the short-stroke type, supposedly on account of the greater cooling of the gases during compression therein and consequently a lesser danger of preignition. Indeed, this motor type will undergo a greater cooling of the gases in the first part of the compression stroke, on the other hand the short-stroke motor will be connected with a more intense cooling of the gases near this stroke. The elapsing of the two losses does not give any advantage to one of the 3.57 inch or 4½ inch sizes over the other.

High Compression Reasons

There might be other reasons, not the rate of heat losses, which might render more practical the use of high compression in the long-stroke engines. Their general proportioning is more adopted for higher specific pressures, the metal is distributed so, that it is less liable to form thick accumulations which would get overheated during the running of the engine and cause preignition, etc.

The combined influence of things like the above does make somewhat higher compression practical in the long-stroke motors. Amid other things this has an indirect influence upon their thermal efficiency, because the whole working cycle elapses between more favorable temperature ranges, the percentage of burnt gases left in the combustion chamber is decreased, consequently giving a cleaner consistency of the fresh mixture, which burns quicker.

Simultaneously with this increase in efficiency the rate of power development per piston displacement of the motor is materially increased, thus giving a manifold advantage to the long-stroke motor over the short-stroke type.

It is possible by following the method used to determine exactly, which stroke-to-bore ratio is connected with the least thermal losses for a given piston displacement. However it is superfluous to carry out this calculation very scrupulously, because the possible value of a slight error in the exact determination of the best stroke-to-bore ratio can be neglected.

Some Efficiency Factors

The relative efficiency of the various combinations changes very slightly near the point of the actual best proportion, and the whole gain amounting to mere percents of the heat loss of paramount value should be the selection of convenient evenly dimensioned sizes for the stroke and the bore of a proposed motor near the actually best proportion. In the case of the simple double ended cylinder as figured in the above example it becomes easy to settle for all piston displacement on a thermally best suitable stroke to bore ratio, which as determined should be about 1.5 to 1.

In motors with the valves located in pockets, of the so-called L or T head type, the problem becomes more complicated, because each individual motor construction will possess a different rate of combustion chamber surface to the whole cylinder volume. This difference is largely due to the location of the valves, their sizes and the connected with it more or less flattened shape of the combustion chamber. At any rate this kind of shape acts reducing the thermal advantages of the long-stroke motors, inasmuch as the heat losses at and near the combustion chamber cylinder end are increased through the greater proportion of the cooled surface to the volume of the flat shape. The total of this surface does not change so much with the variation of the stroke-to-bore ratio, as in the case of the simple cylinder, and consequently the gain of the long-stroke motor also will be more rapidly offset by the losses sustained towards the end of the stroke. **In other words a smaller stroke-to-bore ratio will be the most efficient one in the cylinders with valves in pockets, than in cylinders with valves in the head.**

The increase of the stroke-to-bore ratio rapidly loses its thermal advantages with the greater spread of the combustion space in a plane. In this respect the long-stroke L head type of motor is less efficient than the valve-in-the-head type; and, on the other hand, the T head is inferior to the L head.

Class of Work Counts

Besides the type of cylinder arrangement, the most efficient stroke-to-bore ratio can also be influenced by the destination of the motor for one or the other class of work, whether it is high or low-speed work, light or heavy duty.

On the basis of the foregoing it is reasonable to believe that the conventional L head motor would have the greatest thermal efficiency with a stroke-to-bore ratio of from 1 1/3 up to 1½, beyond which limits it will drop. At the same time, as explained earlier, this motor would gain in mechanical efficiency even with a further lengthening of its stroke in comparison to the bore. This brings forth the problem to find that stroke-to-bore ratio, when the increasing mechanical efficiency ceases with a surplus to offset the gradually rising thermal losses. In fact the moment of the greatest general efficiency will be reached then, when the increasing rate in mechanical efficiency just equals the decreasing rate of the efficiency thermal. Such a generally best ratio will be located somewhere not far above 1.5, and thus the above derivations should settle definitely the economical advantages of motors with a medium long stroke, as for instance with a ratio of the stroke to bore between 1.5 and 1.75. Within these proportions there are apparently no other justifiable economical or constructive considerations, which would form objections to the above range of ratios, favoring instead the short-stroke-motor type.

In connection with the foregoing discussion dealing directly with the mechanical and thermal efficiency of the motors varying with their stroke-to-bore ratio, it would seem proper to use the occasion for indicating here some points not directly connected with motor efficiency, but which are more or less influenced by the stroke-to-bore ratio and besides could be characterised as a special form of efficiency in the performance of the motors. These points will be taken up and considered in the next installment of this article.

(To be Continued.)

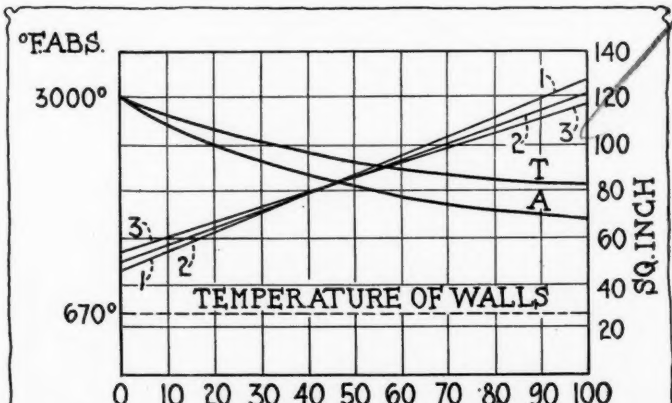


FIG. 7

Variation of the cylinder surfaces of three motors

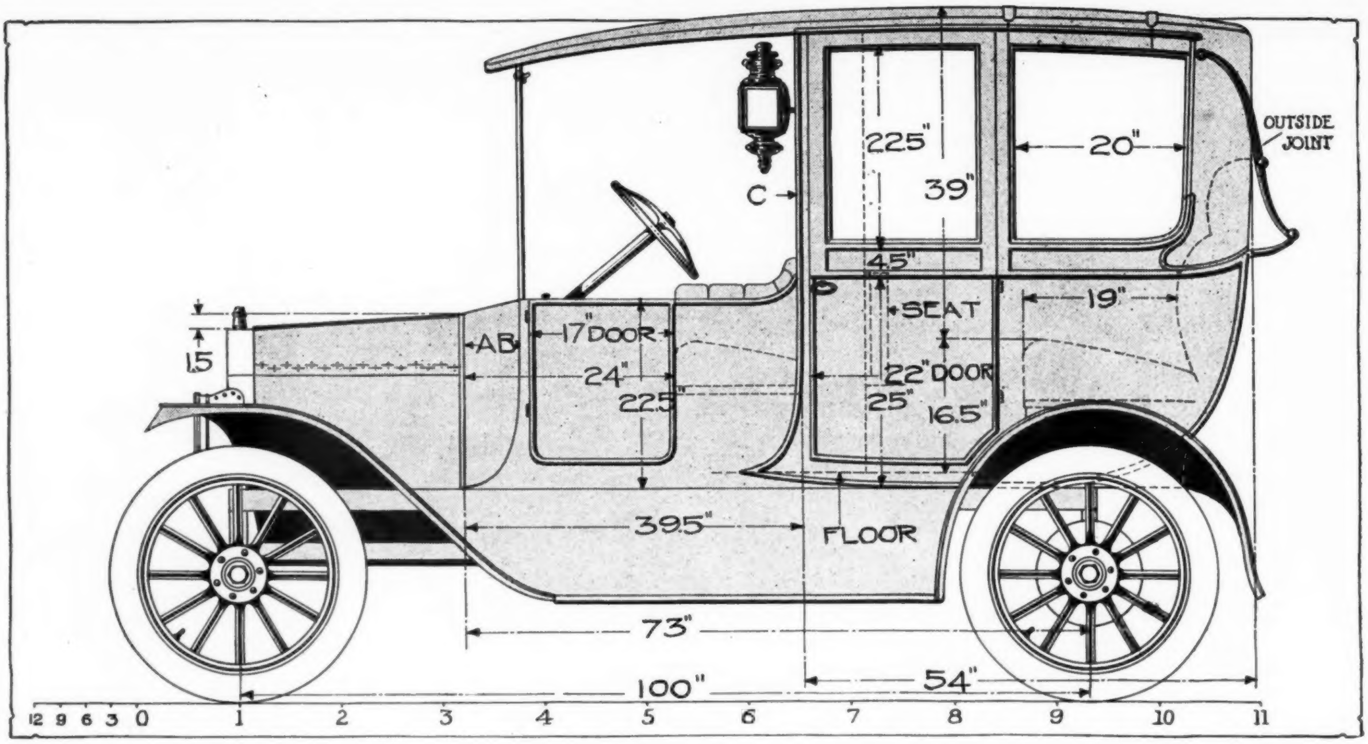


Fig. 1—Semi-collapsible body design adapted for Ford cars. This design employs an outside joint

A Semi-Collapsible Body for Ford Cars

May Be Fitted with an Outside Joint or Not as Owner Desires

By George J. Mercer

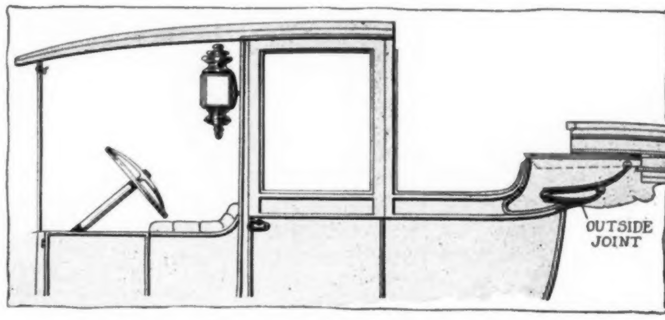


Fig. 2—View of design with top folded, showing outside joint

THE full and semi-collapsible body is making great strides into popular favor. In fact, the public demands that every closed body design must have its duplicate or counterpart in the collapsible form. This condition has prevailed in Europe for some time and the same trend of thought now prevails generally in this country.

Take, for instance, the limousine-landaulet, a design that is virtually the same in every respect as the limousine, except that the rear part of the top is made to fold down. This type of body has gone beyond the experimental stage and it is a practical solution of the combination of the advantages of the large window of the limousine, together with the semi-open or landaulet type.

Similar to Limousine Design

In conformity with the above practice, the accompanying design, Figs. 1, 2, 3 and 4, of a limousine-landaulet design, is offered as the complement to round out the design of the limousine on a Ford that was published in THE AUTOMOBILE for July 17. This body is identical in size and design with the one published, with the exception of the necessary changes that go with a folding-top design. There are four views of this body shown, two with the top closed and two with the top open. The object of showing the four views is that in Figs. 1 and 2 an outside joint is used and on the others it is not. The use of this joint makes a great difference in the appearance of the body.

The use of the outside joint will be optional with the owner in this instance, as the body is short compared with bodies of this class, and the overhang when the top is down is not sufficient to warrant the suggestion that this joint should be used. The use of this joint makes a more rugged wearing construction, and it is recommended where the overhang of the top, when down, is excessive.

Outside Joint Acts as a Brace

The advantage of its use is that it acts as a brace and takes the strains off the fasteners when the top is up and the lower end, or prop, serves as a rest for the lowered top that is positive, and when located well back as in Figs. 1 and 2, it relieves the strain from the lower joint hinge.

For the size of the body Figs. 3 and 4 can be made to do all that will be required in the way of supporting the top and give satisfactory service. Care must be taken, however, that the hinges on the top rail and the back pillar are made extra strong, it being better to provide and put on good hinges at the outset, than to have repair bills after the job is out for some time.

Figs. 3 and 4 are the most popular form of this landaulet in use. In appearance it is the same as the limousine when the top is up, and it has the advantage of being the falling type, without advertising the fact to every onlooker. The article on this subject in THE AUTOMOBILE for March 27 will be interesting reading to those who desire to know just how the framework and hinges of this style of top are made to work. In the article referred to, different forms of top folding and the hinges are illustrated and the drawings show sufficient of the detail.

The specifications used for the design published in THE AUTOMOBILE for July 17 will be applicable for the present design. With the exception of the rear part of the top, this will be of leather and the window in the back will be of the landaulet type. Additional fasteners for use in holding the top joints fast to keep out the rain will be the only other thing in the interior of the body that will suggest the landaulet.

Steel Body Construction

In the construction of automobile bodies in steel sheet the following points which deal chiefly with the method of joining up the panels should be taken into consideration:

First it is desirable that the form of the curved panels is such that the beating necessary to shape them is reduced to a minimum. It should also be the aim of the designer to have as few joints as possible.

Where joints occur on the side of the body under the doorways and the length is not enough to render the joint conspicuous a satisfactory method of joining, so long as there is a solid framing underneath, is to simply butt the edges together, fasten down with screws and file off smooth.

In case of there not being solid framing to hold the screws, a piece of metal should be placed at the back of the joint and the whole soldered together. It is not practicable to make a long joint in this manner as the metal would buckle out of shape because of the heat applied.

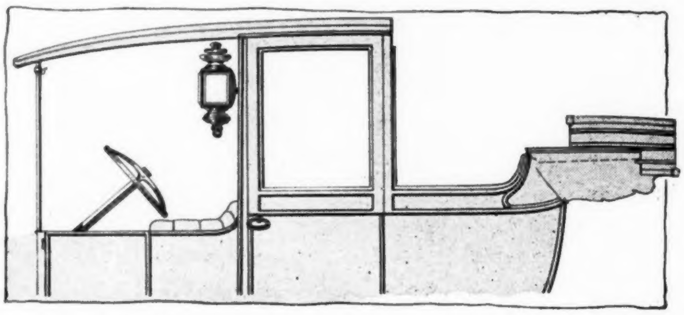


Fig. 3—Body design without outside joint, with top folded

The most suitable metal to use for the panels is soft stamping stock steel, and 22 B. & S. gauge is the best for general purposes. In cutting out, the best plan is to make paper patterns of thick paper by marking off from the framing. These paper templets are laid on the steel sheets, and by cutting up in this manner there is practically no waste.

After the panels are cut from the sheet, they are made to fit the framing, either by sending through the rolls, or beating by hand or power until the panel lays on the framework, without bulges to destroy the surface of the body. Having shaped the panel, the edges are then fastened with wood screws, and when filed and sanded off, the moldings are applied to cover the screw heads. Aluminum moldings are advised as they can be easily shaped and nailed down.

A Remarkable Automobile Service

For a distance of 25 miles through the rugged mountains of Benguet, north of Manila, in the Philippine Islands, there is one of the most remarkable automobile services in the world.

The trains of the system run over the Benguet road between Baguio—the summer capital and hill station—and what is known as Camp One, which is the terminus of the railroad from Manila. This Benguet road—with the exception of a few mountain trails—is the sole communication with Baguio, and everything from first-class passengers to building material that enters the summer capital is carried by this automobile service.

The automobile train consists of high-powered De Dions—eight-cylinder cars being used for passengers and four-cylinder cars for freight—which runs on schedule, makes the return trip from Baguio to Camp One daily connecting with the Manila railroad trains. When the branch railroad to Camp One is washed out, as often happens, the automobile train goes 25 miles farther to Dagupan and back, making the round trip nearly 100 miles. In the 50 miles from Baguio to Dagupan this automobile train ascends 5,000 feet, and this is only accomplished by the excellent system of road maintenance which is worked on this road. Every kilometer there is a caminero—road laborer—who is supplied with a receptacle containing road material and the necessary implements, and it is his duty to keep his kilometer of road in perfect condition.

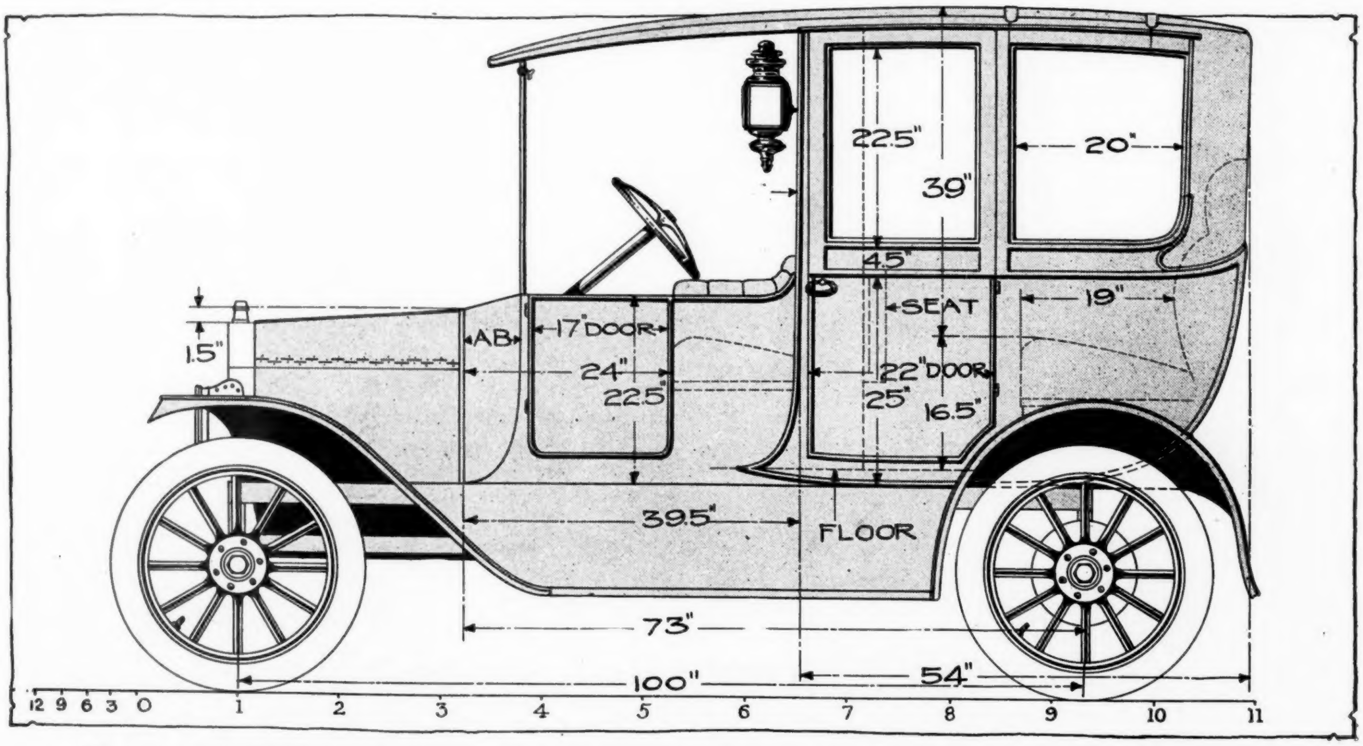


Fig. 4—A semi-collapsible body design for Ford cars without outside joint. Very strong hinges must be used with this type

Battery Versus Magneto Ignition Systems

Modern Battery Systems, If Properly Installed, Furnish a Constant Potential, The Spark Obtained Being Superior to That of a Magneto

By Benjamin F. Bailey

¶The constant voltage ignition possible with a good battery system is superior to magneto ignition in that, while it will give an adequate spark at high speed, the intensity of the spark increases as the speed decreases, becoming maximum when the motor is barely turning over. The heat of the spark throughout the working range is far greater than that of the usual magneto spark; the timing range is unlimited in contrast to the limited range of the magneto, and the intensity of the spark is the same, irrespective of the point at which the spark occurs. The mechanical reliability is greater and the ease of adjustment is far greater than that of the magneto.

WHEN the magneto was first introduced in its modern form for the purpose of furnishing the ignition for automobile engines, it was such an improvement upon the crude coil systems then in use that it soon practically banished these from the field and became the universal source of ignition. The present "landslide" toward the universal use of electric lighting and starting has again revived interest in the subject of battery ignition. Any such system, if properly designed and installed, furnishes an almost unfailing source of current at a constant potential and consequently removes the very real objection to the battery system as formerly applied, namely, that the supply of current was likely to fail when least expected and without warning.

In view of the above it seems timely that we examine into the virtues and limitations of these two ignition systems with a view to deciding whether it is not possible to dispense with the magneto on cars equipped with electric lighting systems in which the batteries are constantly charged from a generator and to take all of our ignition current directly from the battery.

The writer regrets exceedingly that it is not possible to treat this subject in an intelligible manner without going to some extent into the technicalities of electrical engineering. He will, however, endeavor to present the matter in such a form that it may be understood, at least to a considerable degree, without the use of mathematics.

It should first of all be clearly understood that the term "battery ignition" is somewhat of a misnomer when used in connection with a generator supplying current to keep a storage battery charged. It is true that when the engine is being started or the car is being operated at a very low speed that the current all comes from the battery, but as soon as a reasonable speed is attained, the dynamo starts to generate and at and above this speed the current is supplied directly from the generator. In this sense we really have "magneto" ignition with these systems just as much as we have with the usual magneto system, with the advantage that the change from battery ignition to magneto does not have to be made by hand but is accomplished automatically by the fact that the generator starts to furnish current.

Shape of Curves Is the Same for All Magneto Types

In Fig. 1 are reproduced the curves of current and electromotive force of an alternating current magneto, plotted with revolutions per minute as abscissæ. The shape of the curves is the same for a low-tension make-and-break magneto, a low-tension magneto stepping up to a high voltage by means of a coil or of a true high-tension magneto in which the high-tension current is produced directly in the armature. The electromotive

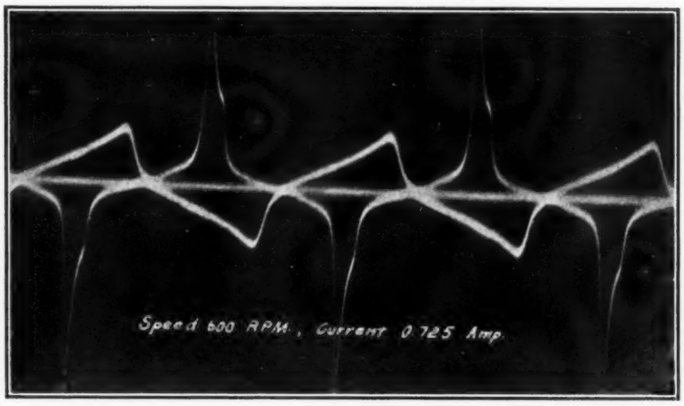


Fig. 1—Curves of current and electromotive force of an alternating current magneto, plotted with revolutions per minute as abscissae

force is that which would be produced in the armature if the contacts were left open all the time, the current is that which would flow if the contacts were closed all of the time, i.e., if the magneto were on short circuit. It will be seen that the electromotive force increases directly as the speed increases but that the increase of the current is less rapid. The reason for this will be very apparent if the reader will accept the statement that electricity acts exactly as though it were matter in motion, and, like the latter, possessed inertia. Therefore, like matter, it resists any attempt to change its motion, whether the change be an increase or a decrease in velocity, namely, in current. This inertia is called self-induction when applied to electricity, and is most in evidence when the conductor carrying the current is in the shape of a coil, and particularly if the coil is provided with an iron core.

At High Frequencies Inertia Overshadows Friction

To understand what happens imagine that we have a "circuit" consisting of a pipe carrying water and that an attempt is made to force an alternating current of water through the pipe by means of a plunger pump. It is evident that the water would resist being set in motion at each stroke and would also resist equally being brought to rest and started in the opposite direction at the end of each stroke. This inertia effect would be very slight and might be neglected if the strokes were slow. In this case the only resistance to motion would be that due to the friction of the pipe. If on the other hand the attempt were made to cause the water to flow back at a high "frequency" it will be evident that the inertia effect would be very great, and

that we should be obliged to exert a very great force to cause the water to flow. In fact, at very high frequencies the inertia effect would entirely overshadow the friction and the latter might be entirely neglected.

Imagine now that we attempt to oscillate the water at different frequencies and that the force used is proportional to the frequency. This would be identical with the case of the alternating current magneto. It will be evident that the flow of water would be greater at higher frequencies but that the flow would not increase as fast as the pressure used or the frequency. The shape of the curve of flow of the water at the different frequencies (speeds) would be the same at that of the flow of current as shown in Fig. 1. The flow would be zero at zero speed and would gradually attain a certain maximum value, this value being reached when the inertia effect predominates to such an extent that the resistance to the flow is negligible.

If in our alternating current water system we were to close a valve in the pipe at the instant when the water was at its highest velocity, it is evident that a very great pressure would result and that the pipe might burst from this pressure. The reason for this is found in the fact that there is stored in the moving water an amount of energy equal to $\frac{1}{2}Mv^2$, in which the M is the mass of the water and v its velocity at the time when the valve was closed. Similarly there is stored in the electric circuit an amount of energy equal to $\frac{1}{2}Li^2$, in which L corresponds to the mass and is called the co-efficient of self-induction and i is the current at the instant of break. From these facts we can readily plot a curve of energy available in the water system of an electric circuit. Since the energy is proportional to the square of the velocity of the current, multiplied by a constant, it will be apparent that this curve will have a double inflection and will be of the general shape of that shown in Fig. 1 marked joules, i.e., energy per spark.

Magneto Really Needs Battery for Starting

An examination of the "energy" curve of Fig. 1 will explain several facts probably already well known to the reader. The output of the magneto is zero at zero speed and continues small

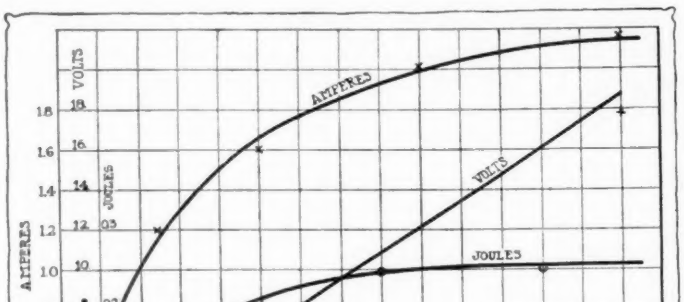


Fig. 2—Curves of current and electromotive force obtained with a well-known magneto. If the timing range were only a few degrees off, the output of the magneto would be greatly reduced

until the speed attains a considerable value. With the magneto it is therefore necessary to employ a battery for starting unless the motor is so small that it can be spun with considerable velocity. At any practical cranking speed the spark is comparatively weak, which explains the difficulty frequently encountered in starting on the magneto, particularly in cold weather. There is a certain speed at which the output shoots up quite rapidly and above this speed the increase is slow and with very high speeds the output would finally reach a maximum.

In order to obtain the maximum output from the magneto for a given speed it is necessary that the current be interrupted exactly at the instant when it is a maximum, just as in the case of the water system it would be necessary to close the valve just at the instant when the velocity was the greatest if it were desirable that the greatest possible pressure and consequently energy be obtained. Unfortunately the average magneto has a decidedly peaked wave of current, particularly at low speeds, and a very exact setting of the breaker points is necessary if the greatest output is desired. This is well shown in Fig. 2, which shows the curves of current and electromotive force of a well-known magneto. It will be apparent that if the timing range were only a few degrees off, the output of the magneto would be very seriously reduced. This is of importance in connection with the timing range of the magneto, particularly at low speeds. The only type of magneto construction in which this difficulty is entirely avoided is that in which the whole field magnet is capable of rotation about the armature shaft as an axis. This is effective but introduces undesirable mechanical complication.

Full Strength of Current Attained Gradually

In our study of battery ignition, or, as the writer prefers to call it, constant voltage ignition, the water analogy will again be of service. The system to be considered here is not the old trembler coil system in which a number of sparks were produced for each closing of the primary circuit, but the so-called single-spark system in which the circuit is closed for a certain definite percentage of each revolution of the times. The current therefore flows for a greater length of time for each spark when the speed is low than is the case when the speed is high. Only the one contact is used and the condenser is ordinarily shunted across these contacts. The connections are as shown in Fig. 3.

The conditions in the electric circuit are comparable to those in the water system if we were to start the water in one direction by means of a piston, and after it was in motion suddenly to close a valve, bringing the water to a quick stop. The first period corresponds to the time during which the coil is connected to the battery and the closing of the valve corresponds to the opening of the electric circuit.

It will be apparent in the case of the water circuit that with a definite pressure applied to the water the full velocity of the stream would not be attained at once. If we should plot a curve of velocities and times the shape of the curve would be that shown in Fig. 4. This particular curve is, however, that of the current starting through an induction coil. When once we realize that the electric circuit acts just as though the "electric fluid" had inertia, it will be apparent that the shape of the two

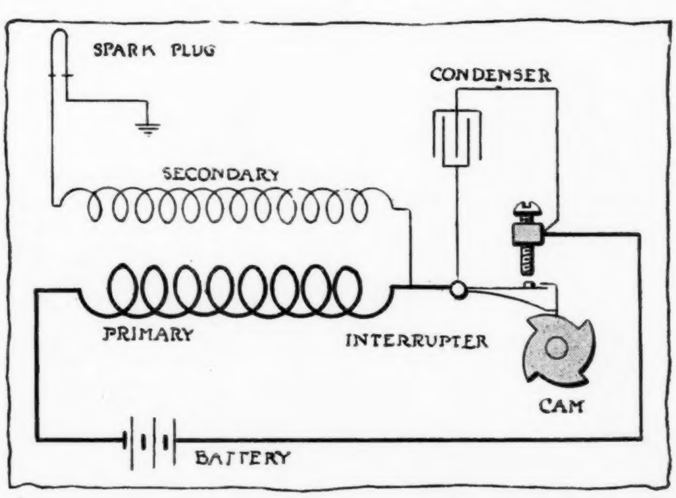


Fig. 3—Connections for the so-called single-spark system in which the circuit is closed for a certeain definite percentage of each revolution of the timer

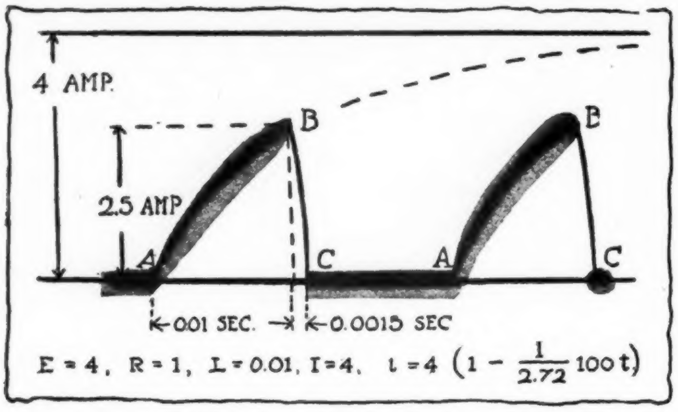


Fig. 4—Curve of the current starting through an induction coil

curves will be the same. The current starts from zero, rises gradually and finally attains the value given by Ohm's law, $I = E/R$.

As before, the energy stored in the water at the instant the valve is closed is equal to $\frac{1}{2}Mv^2$, and in the electric circuit $\frac{1}{2}Li^2$. We can readily derive a curve giving the current at the instant of break for the different speeds. Such a curve is given in Fig. 5. From this curve a curve of output per spark is readily derived.

It will be apparent that the current at break and consequently the output per spark will be a maximum when the speed is zero, since then the current has unlimited time to rise to its full value. The output per spark will therefore be greatest or the spark will be the hottest when the engine is turning over very slowly. It is desirable that we have a very hot spark for starting and to give the greatest possible power at low speeds.

On the other hand, the higher the speed the weaker the spark, and it might appear that the magneto would have a great advantage at high speeds. It is however entirely possible to so design the coil so that the current will have time to build up to nearly its maximum value even at the highest possible engine speeds, or at least to attain such a value that sufficient energy is available to give proper ignition at high speeds. The spark will be somewhat hotter at low speeds, thus giving some reserve for the difficult ignition incident to starting and slow running with the throttle open.

Constant Spark System Has Advantages

Another well-known system of battery ignition that is well worthy of mention might be designated as a constant spark system. The mechanical arrangement is such that at the time when ignition is desired the contacts are thrown together by means of the impact of a small hammer and are separated a small fraction of a second later by the action of a spring. In this manner, the time that the contacts are together is absolutely independent of the speed of rotation of the timer and the spark is consequently of the same strength at all speeds. The principal advantage of this construction is that the consumption of current is reduced at low speeds. This was a vital matter when ignition with a dry battery as a source of current was common. With a storage battery of considerable capacity, kept fully charged at all times from a suitable generator, this advantage practically disappears. In the writer's opinion, it is on the other hand highly desirable that the spark be considerably stronger at low speeds, since then the mixture is apt to be poor, and if the engine is pulling hard, the compression will be high. It is also highly desirable to have a strong spark for easy starting.

In Fig. 6 are shown the curves of output of various ignition systems, all plotted with revolutions per minute of the engine as abscissae. The ordinates are the joules of energy liberated per spark. All of these curves are from actual tests of the apparatus carried out by the writer.

Curves A and B are those of well-known automobile magnetos. Both were of about the same size, weighing approximately 26 pounds. Magneto A is the largest size offered by its maker and is adapted for use with the largest engines. Its large output is very evident from the character of the spark produced by it as well as from an inspection of the curves. The output of magneto B is very small by comparison, but nevertheless its output is entirely sufficient to give good ignition at reasonable speeds. In fact, the magneto was removed from a car for the purpose of this test. It is, however, nearly impossible to start the engine with this magneto, and its output is also insufficient at very low engine speeds.

Curve C is that of the single-spark system above described. The output is of course constant whatever the speed. This also is low, but the device has been sold in large quantities and has given entire satisfaction.

Increasing the Output of a Coil Is Very Simple

Curves D and E represent the outputs of two different ignition coils operated from a constant potential battery or generator. The interrupter used was of the type in which the contact is closed for a certain portion of the time of each revolution, and consequently the contact is largest at low speeds and short at high speed. Both were taken using the same interrupter and the same induction coil, except that the winding of the primary was changed. Coil E is a very "quick" coil, that is, the current builds up to its maximum strength in a very short time, so that the strength of the spark is nearly constant, increasing however somewhat for slow speeds. Coil D on the other hand is so proportioned that the spark is much stronger at low speeds than it is at high. In general, coil E would be preferable, since it takes less current and consequently causes less wear on the platinum points. The output at even the highest practicable speeds is about three times as high as is really necessary. If, however, for any reason a still stronger spark is desired, a coil having characteristics similar to coil D may be furnished. In fact, so simple is the matter of increasing the output or changing the characteristics that almost any change that may be desirable to suit the individual motor may be readily made.

It may be argued that for racing the hottest possible spark at high speeds is wanted. To meet this condition, if necessary, it would be entirely possible to supply a second coil adapted to very high speeds and throw from one to the other in the same manner that we throw from battery to magneto. It is doubtful, however, whether or not any increase in speed would result, as the spark delivered may be made ample at any speed. We have a comparatively unlimited supply of power and can afford to supply plenty of energy to the spark, whereas the power of the magneto is definitely limited to a comparatively small amount.

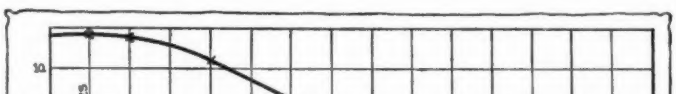


Fig. 5—Curve giving the current at the instant of break for the different speeds. From this curve a curve of output per spark is readily derived

In the preparation of the curves of Fig. 6 it was assumed that the efficiency was 100 per cent., and in the case of the magneto that the timing was exactly correct, that is, that the break occurred exactly at the top of the wave of current. The subject of the losses that occur in coils and magnetos is too large a one to be taken up here in detail. The reader may find additional information in the article referred to. In general, it may be said that the losses in the magneto and in the coil will be approximately the same, except in two particulars. The magnets and pole pieces of the magneto being solid give a chance for the production of considerable eddy current losses. This is absent in the coil system.

On the other hand, it is necessary to take precautions to avoid excessive loss at the platinum points where the circuit is interrupted in the case of the coil system. This is particularly so at low speeds and follows from the fact that the input to the coil is so much greater than that of the magneto under these circumstances. Many battery ignition systems fail on this account to deliver a satisfactory spark at low speed.

In the case of the ordinary coil or magneto the speed at which the contact points separate is proportional to the speed of rotation. That is, the movement of the points is controlled by a cam and the movement is proportional to the speed of the cam. This results in a very slow opening at low speeds, with the consequent formation of an arc between the breaker points as well as a slower opening of the circuit. Both of these effects reduce the strength of the spark to a very great extent. To return to our analogy of the water pipe, it is as though the valve used to close the pipe leaked badly. Obviously the rise in pressure would be less than would result if the valve fitted perfectly and shut off the flow of water instantly. The arrangement illustrated in Fig. 7 was devised by the writer to avoid this difficulty. With this system the speed of opening the circuit is absolutely independent of the speed of the engine. This is accomplished by using a cam of such shape that the contact lever when it arrives at the point of ignition drops under the influence of the spring. In addition to the sudden break obtained in this way, the action is still further assisted by the fact that the contact is not broken at the instant when the lever starts to fall but is maintained until the projection of the lever strikes the light spring which actually carries the contact point. The final break is therefore the result of a hammer blow and is very sudden. The spark produced in the cylinder is stronger and at the same time the platinum contact points are not worn away by arcing.

Timing Range of Magneto and Battery

In the magneto there is only one point at which the contacts can be set to break if the maximum spark strength is desired. It is of course true that a much weaker spark than normal will suffice to give ignition, and by taking advantage of this fact it is possible to time the spark through a considerable range. It

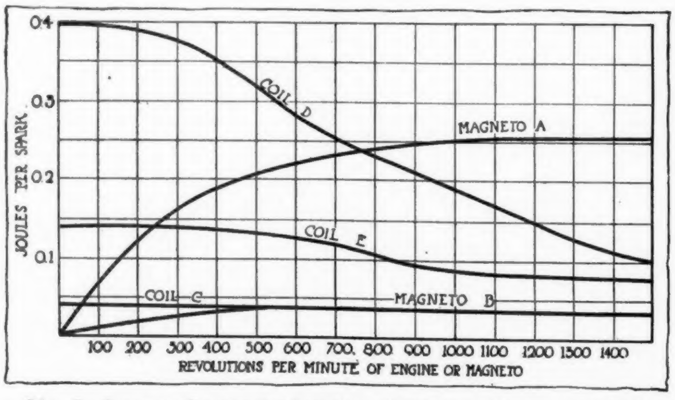


Fig. 6—Curves of output of various ignition systems, all plotted with revolutions per minute of the engine as abscissae. The ordinates are the joules of energy liberated per spark. All the curves are from actual tests made by the author

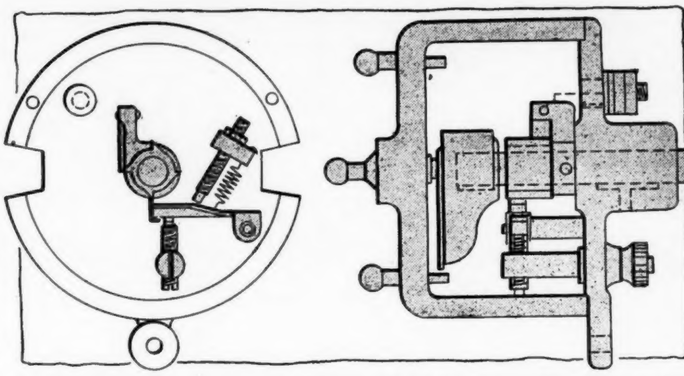


Fig. 7—With this arrangement, devised by the author, the speed of opening the circuit is absolutely independent of the speed of the engine. The shape of the cam used causes the contact lever to drop under the influence of the spring when the point of ignition is reached.

is difficult to find a satisfactory basis for comparing different magnetos in this respect. In a recent test of twelve magnetos the writer took as the timing range that percentage of the total time during which the available power of the spark did not fall below a sixteenth part of its maximum value. This surely is a liberal estimate, and on this basis the magneto having the best timing range will deliver a spark during 53.4 per cent. of its rotation. The poorest, during 23.3 per cent. of the rotation. It might be pointed out that the magneto having the longest range was not of the usual construction, and the spark delivered by it at any time was so weak that it could hardly be considered seriously. The next best had a range of 47.5 per cent.

With battery ignition the timing range is absolutely unlimited. The spark is identically of the same strength wherever it occurs. Thus the spark may be retarded or advanced to the fullest extent without the least danger that the ignition will be weakened. This fact also simplifies the timing of the engine, as it is not necessary to consider the relation of the position of the magneto armature to the time of opening of the contact points.

Reliability of the Magneto and Battery

After all, reliability is the prime requisite of an ignition device. The finest ignition in the world is of little value if it is apt to fail in service. The high-tension magneto in which the high-tension current is produced directly in the armature shows marvelous skill in the use of insulating material, and the way these devices "stand up" under severe service is truly admirable. At the same time it cannot be denied that the space available for insulation is very limited and as far as the writer knows every maker of these devices insists upon protecting the windings of his machine by means of a safety gap connected across the terminals of the machine in parallel with the plugs; thus, in the event of a wire becoming unfastened from the plug, another path is open for the current and the danger of breakdown to the insulation is avoided.

In the high-tension magneto the armature itself is the induction coil. The current is induced in the coil by its rotation through the magnetic lines supplied by the field. On account of the limited space the insulation is rendered difficult and the possible power is comparatively small. In the coil the winding is stationary and may be made of ample size. The insulation may readily be made adequate to guard against the possibility of breakdown and since the size is not limited, the power may be made ample. It is easily possible to provide a coil that will deliver a spark an inch or more in length, or by discharging over a short gap give such an intense spark or rather flame that the wood of a match is readily ignited.

In the high-tension magneto since the armature acts as the coil, it is necessary, or at least desirable, that the contact points should revolve with the armature. For the same reason the condenser revolves with the coil. On this account it is impossible

(Continued on page 389.)

The Engineering Digest

Reasons for the Wobbling of Front Wheels Taking Place in Many Automobiles at Driving on Rough Roads—Tell-Tale Results From Trials of Trucks

AT speeds of 50 kilometers per hour and higher, a correspondent complains, the front wheels begin to oscillate in a very disconcerting manner and he has in vain put stronger springs in the steering-rod, receiving these stronger springs from the manufacturers of his car as a suitable remedy for the trouble. It continues nevertheless. *Omnia* explains the source of it by means of the illustration reproduced in Fig. 1. In this, the first sketch represents those relations of the steering-rod to the wheel and front spring which give least cause for complaint in this matter of having the steering rendered insecure by the shocks received on the road by the front wheels, while the second sketch represents relations which produce the conditions complained of and which, furthermore, cause excessive wear of the front tires, since the oscillations of both front wheels on their pivot pins produce a grinding of the rubber fabric against the road. In the first case, the end of the steering-arm, A, the front end of the steering-rod, C, and the pivot of the front spring, B, are nearly in a straight line when the vehicle spring is at rest under normal load. Under the effect of a shock, C moves in the arc of a circle around B to C2, in so far as C represents the end of the crank by which the wheels are turned and to which the forward end of the steering-rod is jointed. But C should also move to C1 in the arc of a circle around A, in so far as it represents the forward end of the steering-rod. To do both is impossible, and therefore the usual result is that C2 is pulled back to C1 by the springs in the steering-rod; which means that both front wheels are turned around correspondingly and are turned back to the other side of the straight-ahead position when the vehicle spring rebounds after the shock. According to the authority of *Omnia*, the movement is so small, however, when the design of sketch 1 is followed, that steering and tire-wear are not seriously affected. According to current practice in automobile construction the bad results are minimized by giving the springs in the steering-rod the proper tension and by giving the worm of the steering-gear such a high pitch and keeping it so well lubricated as to make this gear reversible or semi-reversible, thereby allowing some of the turning-motion of the front wheels to be transformed into a small oscillation of the steering-wheel which the driver can follow or resist with his hands as he thinks best or as his habits in this respect have been formed.

An important element is that the spring stretches under shock and thereby makes C2 come nearer to coinciding with C1, as required.

On the other hand, if the relations are made such as in sketch 2, the oscillations of the front wheels can become so marked at a strong rebound of the vehicle-springs as to become very disconcerting; and therefore very dangerous when the shock is received at high speed, as it is most likely to be, and the driver is not very skilful. This effect is indicated in the sketch by the marked distance separating C3 from C4. Even when no accidents are caused, the extra wear of tires due to the bad disposition can be so pronounced that, according to *Omnia*, the front tires wear out before the rear ones.

When flat springs were introduced, mainly by the initiative of Renault, the main reason for their adoption was said to be that they minimized this conflict between spring action and the security of the steering. The steering-systems in which the steering-rod is placed transversely, approximately in the plane of the axle, as is done in some small cars and in many trucks and delivery wagons, also incidentally reduce this conflict and the dangers it involves, although the actuating reason for the adoption of transverse steering-rods has usually been another one; namely, lack of space for a fore-and-aft steering-rod of the necessary length.

As a matter of history, the long side-springs which were used in Oldsmobiles of the old type with curved, toboggan-sled dashboards and in a few other small cars of the same period were dropped from automobile practice mainly because their action produced a similar conflict with the steering system and, in case of one-sided jolts, a similar wobbling of the front axle.

Where the relations of parts in the ordinary steering-system are such as shown in sketch 2, Fig. 1, it is sometimes recommended to use very stiff front springs with clips on the leaves. They naturally reduce the conflict by reducing the amplitude of spring movements, both compression and rebound, and it is contended that the comfort of the vehicle is not always impaired, especially if the inflation of the front tires is at the same time reduced. The latter expedient does not influence the steering by moving the axle (though it makes it slightly less secure for other reasons) and softens the action of the stiff springs on the motor mechanism.

How complicated the whole matter is, and how difficult to remedy radically, is shown by the fact that the practice of pivoting the front spring at the rear and shackling it in front, which could have remedied the conflict if the position of the pivot had been chosen so low as to practically coincide with the average position of the end of the steering-arm, never made much headway; mainly, it is said, because the shocks to which the rear half of the vehicle spring was exposed by this arrangement proved too trying for the sensitive steels of which automobile springs are made and, secondly, because the lateral alignment of the front axle was somewhat less steady with a shackle joint than with a pivot pin at the front beaks of the frame.—Partly from *Omnia*, August 9.

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The Stockmotor Pflug Actien-Gesellschaft m. b. H. (Stock Motor-Plough Company, Ltd.) of Germany has found occasion to increase its capital stock from 1 million to 5 million mark, thus indicating the growth of its business and considerable confidence in the future for this branch of the motor industry.

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Faults Revealed in Some of the Tested French Trucks Look Like Mishaps Incidental to the Progress in Design

UNOFFICIAL observers at the military trials of trucks which have just come to a close in France report a few mechanical troubles which occurred to some of the machines. The melting of the connecting-rod bearing was one which indicated faulty design in three machines; perhaps a disproportion between the motor and its work but probably only defective lubrication due only in part to the relatively small dimensions of crankpins and connecting-rod knuckles and

remediable through increased pressure in the oiling system. In two instances the cylinder castings cracked. In one of these cases the casting was of the block type, and the observer noticed sharp angles and a deficient bridging between the cylinders proper and the water jackets. The other case seemed to be due to faulty suspension in the frame, this in turn due to the need of complying with certain regulations for the tests which the builders had overlooked in the first place. A gear-shifting fork was broken in one of the vehicles, due to faulty design for dropforge work. The pinions in a special reduction-gear combined with the differential gave out. A transverse drive-shaft ran hot in one of its universals, owing to too great obliquity (probably under light load). In some vehicles the working parts seemed to be rather small for their work, judging from the wear they showed. Aluminum pistons, it is stated, gave no trouble.—From *L'Auto,* August 13.

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At the automobile show recently held at Saint Petersburg, Russia, there were sold, according to the latest official information, 400 motor boats out of the 500 which were exhibited, 400 automobiles, 50 motor trucks and 45 agricultural tractors. In addition, orders for 300 automobiles which could not be delivered on the spot, were placed with exhibitors. The total amount of business done reached about 4 million rubles or 2 million dollars.—From *Pratique Automobile.*

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Not the Work, But the Vibrations Decisive for Choice Between Slow and High-Speed Motors

A contribution to the question whether light, high-speed motors can be employed in trucks—under the supposition, of course, that the necessary gear reduction is taken care of—comes in the form of a communication from the Saurer firm to a French contemporary. Saurer maintains that his engineers have tried out the light motors for heavy work and have got excellent results from them so long as vibrations were absorbed in a flexible suspension, especially pneumatic tires, but that, on the other hand, the organs of such motors give evidence of rapid fatigue of the metal when the vehicle in which they are used is mounted on solid rubber tires. The reference is to motors with speeds of up to 3,000 revolutions or piston speeds of more than 10 meters, and with the parts correspondingly slender. On the other hand, the motors considered as slow and heavy turn at 1,000 to 1,200 revolutions and are similar to those used for many pleasure cars in which the power plant is of a conservative type.

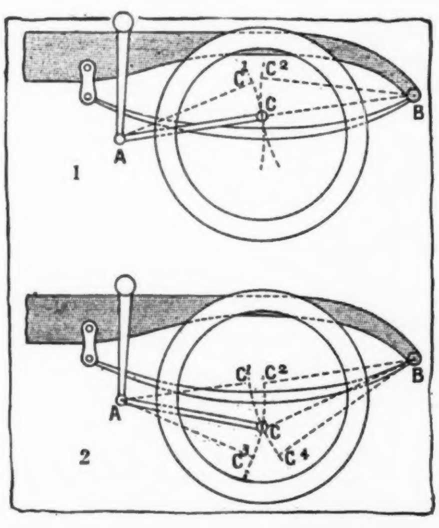

Fig. 1—Illustrating the conflict between the ordinary steering system and the usual spring suspension. Upper sketch shows the least objectionable relations; the lower sketch shows relations which become dangerous at high speed.

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An Englishman has a sailing yacht 11 meters long and an automobile of 16 horsepower. He has now equipped the yacht with an adjustable propeller and arranged a place amidships in the hull where the automobile can be placed in position to drive the propeller. When landing, he hoists the automobile out and uses it for inland excursions.—From *Automobile-Welt,* August. 1.

Characteristics and Shortcomings of Trucks Passed in Review After the Annual Military Trials

An unusually frank analysis of the advantages and disadvantages displayed by different forms of construction in French motor trucks is presented by Charles Faroux in *L'Auto* on the occasion of the termination of the annual military trials for this class of vehicles, which were held this year from July 1 to August 12 and were extended over a circuit of 3,500 kilometers, taking in many provincial towns and districts where the event took on the outward character of a public demonstration for the benefit of the industry and for those large portions of the provincial population who had not yet become impressed by the benefits to be attained by hauling heavy loads by motor power instead of by horses. The trials are described as having been more severe than those conducted in previous years within a comparatively short radius from the town of Versailles. The analysis deals with the principal organs, excepting the motor, substantially as follows:

The Clutches

Multiple-disk and leather-faced cone-clutches shared about alike the preference of constructors. Neither one type nor the other made trouble. Nevertheless the question as to which type should be preferred in any given case is sometimes difficult to resolve. The cone-clutch has robustness in its favor. It demands scarcely any care and, in case it is spoiled, it can be made over at the roadside and by the means at hand. The disks call for a certain watchfulness, but it is also true that spare disks may be carried and that replacement of injured disks is not beyond the skill of an ordinary chauffeur. Under the feet of an unskilful driver, moreover, a good disk-clutch gives less occasion for tinkering than a leather-faced cone-clutch. Those who drove in the military endurance contest were certaintly not unskilful. On the contrary, every company had naturally sent its most experienced men, and it is not to be wondered at that each of them got the best out of the vehicle in his care. On the other hand, under average commercial conditions the heavy trucks are frequently entrusted to rough teamsters, and these should have clutches which cannot go astray. However perfect a leather cone may be, it can happen that it turns rough, either because it gets no care at all or by abuse or because it is cleaned with gasoline injudiciously. And if it is then operated maladroitly in a heavy truck, where the inertia at starts is very considerable, it is a sure case of breaking something in the transmission. During the trials with trailers certain things happened which showed the importance of having a clutch which can be allowed to slip under load without becoming injured.

Where Leather Failed

These trials took place on a stretch of road where a grade of 5 per cent. gradually rose to 7 per cent. at a turn and then again gradually fell off to 4 per cent. The first start took place on the 5 per cent. grade. Many of the trucks, having too high a low gear could not get over the 7 per cent. grade, but what happened to a number of them was this: After succeeding in starting somehow on the 5 per cent. grade the vehicles climbed to the turn without trouble. There they came to a stop. The 7 per cent. turn could not be made except with the aid of the motor in the truck playing the part of a trailer. Then, after the critical point was passed, the hauling of the trailer was resumed, but—this is the point—a goodly number of the trucks which had climbed 6 per cent. before reaching the turn could not start on the 4 per cent. grade following it. From the violent shakings of the tractor-truck at each attempt it was easy to see that the cause of this balkiness lay in the roughness of the clutch produced by the previous overtaxing of it at the turn. And all the vehicles to which this thing happened had leather-faced cone-clutches. The other vehicles were started in some manner, not easily but without too many shocks, and several of them got past the critical point with the clutches slipping.

Evidently this maneuver is not recommendable, but it can be necessary in exceptional instances and it should not affect the mechanism. There seems to be a serious argument in favor of metallic clutches in the circumstances related.

The Gearboxes

Let it be said at once that the design of a gearbox for heavy vehicles brings out problems which do not exist in the case of a gearbox for a touring car. With regard to the latter a large number of our manufacturers have fallen into the easy habit of making the ratio of the gearspeeds almost anything that comes handy. The best ratio in the bevel-gear is determined by experiments on the road, and then the same gearbox is put into all the chassis which the factory turns out, from that of 12 to that of 30 horsepowers. The cost of construction is naturally a leading motive, and, as the motors generally have a sensible surplus of power, considering the weight of the vehicle, the method works out, in a fashion. The cars are driven mostly on the direct gear and, at all events, the low gear permits one to get out of difficulties.

The matter stands differently for the trucks. There is no surplus of power, because the fuel consumption has to be reduced to a minimum. All the gearspeeds are used, one nearly as much as another. The ratio of the gears should therefore be seriously studied, so as to obtain the best possible effects in all cases.

The tests of capacity for hauling a loaded trailer wagon, which were imposed this year for the first time, have shown that the low gear is too high in most of the trucks.

With regard to the proper design of an economical gearbox for trucks, while it would be beyond the scope of this review of recent tests to enlarge here upon the study of this subject, it may be said that it is indispensable to have the design worked out with strict reference to the power-curve of the motor.

Few Direct Gears

Several of the trucks in the tests had no direct gear; and this is rational. As may be remembered, in the arguments which were advanced against a direct gear in 1903 and 1904, before this feature had been definitely adopted for pleasure cars, it was admitted that the direct gear increased the mechanical efficiency of the power transmission when it was in mesh, but it was urged, on the other hand, that the arrangements necessary for establishing a direct gear reduced the efficiency for the intermediate speeds. If it took some time before the direct gear finally won out, it was no doubt not only because there is a natural resistance to every new feature but also because the intermediate speeds in those days were used much more than they now are in pleasure cars.

In the trucks, however, with their great weights and relatively low powers, the argument which is based on the reduced efficiency of the intermediate gears still holds good, since these are used more than the highest gear. The gearboxes without direct gear also present another advantage: They admit of a larger gear-reduction between the motor and the wheels. This is a feature so much more important as motors of high speed find more general employment for trucks as well as for pleasure vehicles. With a direct gear in engagement the drive-shaft turns at the speed of the motor and imparts a corresponding speed to the small pinion in the bevel-gear and, as it is known to be bad practice to reduce in a higher proportion than 1 to 4 in the bevel-gear, no other means remain for effecting the necessary speed-reduction than either the reduction of the size of the sprocket pinions, in a chain-drive vehicle, or the addition of a special reduction-gear in the axle or in the hubs of the wheels.

By dispensing with a direct gear, this reduction can be effected in the gearbox, which simplifies matters.

The Power Transmission

The transmission proper is effected in most of the trucks by chains. Transmission by drive-shaft, in one form or another, begins to make itself felt, however. The rear axles can now be built light enough and strong enough to serve well for trucks, and one can therefore look forward to the disappearance of the chain without regrets, despite its precious advantage of permitting a ready variation of the transmission ratio.

The lateral drive-shafts in De Dion Bouton trucks with reduction-gears in the wheels present one of the best solutions of the problem. Other reduction-gears of the epicyclic type which were used on the tractor-trucks gave rise to some mishaps. The drivers of these vehicles showed that they were aware of this shortcoming by carrying spare pinions for replacements. The worm-drive has made its appearance on the industrial vehicles and solves elegantly the problem of a sufficient gear reduction. It met with no troubles. Its advantage lies in its silence, otherwise; its disadvantage in its smaller efficiency, which perhaps predicates it as better adapted for vehicles of luxury than for trucks.

The figures which are available on the subject of the efficiency of the worm-drive may be stated as follows: In identical gears of Lanchester's make Dr. Riedler of Berlin found efficiencies ranging from 86 to 89 per cent., according to the speeds used; Stodola of Zurich found from 88 to 92; the F. N. company of Herstal, Belgium, found from 89 to 94, and the English Daimler company found at high speeds 96 per cent.; the author found efficiencies ranging from 82 to 96 per cent. at speeds ranging from 300 to 2,500 revolutions. This might seem to be a case of too many figures. With bevel-gears, however, the figures obtained are better. The F. N. people find 98 per cent.; the Panhard company likewise, and the author has personally found percentages ranging from 92 to 98 at speeds ranging from 300 to 2,500 revolutions in the case of a pair of Malicet & Blin gears. The difference is notable. [In order to have any value with reference to the question of applying the worm-gear to trucks, all the figures quoted should have been accompanied by data relating to the loads, pressures and areas of gear surfaces in contact, it seems.—Ed.]

Wheels—Wood or Metal

All the vehicles except two were equipped with solid rubber tires. The iron tire has seen its day. There were some metallic wheels; some of them cast, others made of pressed steel. Nobody can fail to see the object in adopting steel for the wheels. It is enough to have heard the rattling of the wood wheels on motor omnibuses. In Germany, moreover, where the builders have now had long experience, all use steel wheels. But whether it shall be the cast or the pressed steel wheel nobody knows yet. At present the best results seem to have been obtained by the use of cast steel wheels with tubular spokes.

As for the tires, tests exending over a mileage of only 3,500 kilometers give no clue to the durability of tires whose guaranteed average life runs up to 35,000 kilometers and, in the case of some tires of higher first cost, even to 60,000 kilometers.

Brakes

The brakes constitute the most deficient feature in the construction of the chassis. Without entering upon details, the observations made may be summarized briefly: The brakes acting on the transmission are powerful, sometimes brutal, but after all they do their work. The motor brakes are excellent from all points of view. The wheel-brakes are, with a few exceptions, of indifferent merit. And yet, it ought to be considered that it is only by means of the wheel-brakes that a vehicle can be stopped if a chain breaks. To think that the self-regulating brake invented by Captain Hallot is not adopted! Is it not unbelieveable? [The Hallot brake which Mr. Faroux has recommended for years but in vain, was described in The Automobile in 1909.]

Altogether enormous progress has been made in the construction of the trucks, but this does not mean that perfection has been attained. The truck of 1913 is about at the point in its development where the touring car was in 1907.—*L'Auto*, Aug. 9.

Engineers Disagree on Starter Units

Part V

Mitchell-Lewis Engineer Prefers Three-Unit System—Westinghouse Man Likes Magneto-Generator—Apple Electric Man Prefers One-Unit System—Dean Electric Engineer Favors Three Units

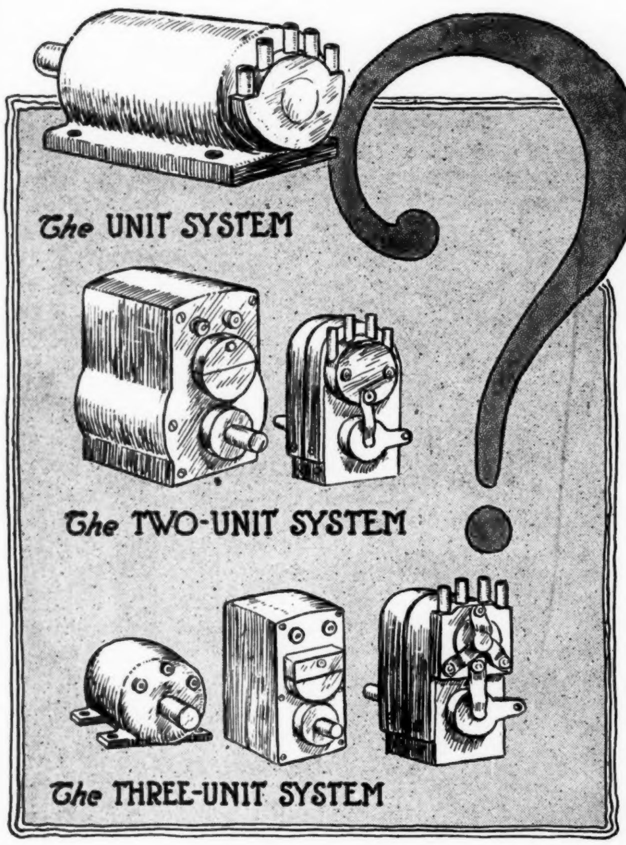
RACINE, WIS.—Editor THE AUTOMOBILE:—In regard to the six questions on different aspects of the starting, lighting and ignition systems, I will endeavor to give my side of these points.

1—The first point is to have three separate units on a car as we find this to be more satisfactory for the manufacturer and also the individual owner. In the first place, the owner has become familiar with the magneto, and can very readily take the same apart and clean and repair it, as these are not very complicated. Next is the generator. Taken as a separate unit, we also will find that this is not very complicated, and can be cleaned and repaired very readily. Next we come to the starter which has now appeared on the market, so designed that they can be gotten at with very little trouble.

The unit systems in which starting, lighting, and ignition are combined are very complicated for the individual to see through. Should any point go wrong, this would put the three units out of commission, as one depends on the other. The owner would have to call in an expert to repair the same, whereas the magneto with which the public has been getting familiar has now been designed to give very satisfactory results and standardized so as to be interchangeable. Also, when looking at the generator combined with starter and ignition, should this part go wrong the complete combined unit is out of commission, whereas when three separate units are used just this certain unit is wrong, and can be gotten at and sometimes repaired by the man owning or running the car. Also this does not put the three units out of commission and keep the car from being used if three separate units are used.

The manufacturer of motor cars will have to design his engine to suit this combined unit, and, as it is a very large outfit, he will have to get more room under the hood to take care of this large unit. Right here is where all the trouble will be, as all motors, or rather engines, are not designed alike in respect to size. The motor will have to be designed according to the bore, stroke, and compression, taking into consideration the added resistance found in cold weather. The size of this three unit will depend on the horsepower of the engine to be cranked.

Also the method of coupling comes in at this point: where an engine has a large bore and a long stroke, there would be very little room left for the combined outfit to be coupled to the front of the engine as there is little room under the hood. My preference is to have three separate units, magneto to be installed on the engine, also the generator and the starting motor to be placed near the transmission back of the engine to connect with an extra gear. By cutting gear teeth in the flywheel there is a chance of breaking teeth from the flywheel or wearing, which then will have to be replaced by a new flywheel. By putting in a gear on the shaft of the engine with the clutch this can be renewed very cheaply. Also when cold weather has set in and everything is cold the clutch can be pushed out or disengaged, the starting motor be started until it has gotten up speed, and then letting the clutch in starts the engine. This will release a heavy strain on the motor and an excessive draw from the battery, which in time will injure the battery. As the battery manufacturers do not want the battery discharge too low, it will therefore be necessary that this be protected so as not to have an excessive draw from the battery.



The Six Questions

1. *Which will be the eventual system, namely: (a) Unit system, in which starting, lighting, and ignition are combined; (b) two-unit system, in which starting and lighting are combined, with ignition separate; (c) three-unit system, in which ignition, starting, and lighting are separate?*

2. *Respective methods of coupling starting motors with the gasoline motor?*

3. *Possibilities of weight reduction in starting systems?*

4. *Increased accessibility of the battery for starting and lighting purposes and if excessive initial draw from the battery is injurious?*

5. *Positive locking means whereby tampering by outsiders cannot lead to shorting and discharging of batteries?*

6. *Movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance?*

Editor's Note

Readers of THE AUTOMOBILE who are owners and operators of cars are invited to participate in the present discussion on the relative merits of combined starting, lighting, and ignition units.

The three systems are best described as the unit, the two-unit, and the three-unit types. In the unit type the electric motor for starting, the electric generator for battery charging, and the ignition system are in one. In the two-unit system the battery dynamo and the starting motor may be combined in one machine with a single armature. In the three-unit system there is a starting motor as one machine, the battery charging dynamo is a second machine, and the magneto for ignition is the third.

It is on the relative merits of these types that this discussion hinges. Owners who have had practical experience with them should be able to give points of much value.

The possibilities in reducing weight are very small. The motor is designed to do just so much work and trying to reduce the metal will also reduce the amount of work it should perform. If the motor is designed to give, say a 20 foot pound torque, and the metal of the motor is then reduced, the motor will then also be reduced in power.

Increased accessibility of the battery should be the point to work to. By installing that battery away under the car or where it takes time to get at there are chances that it will never be looked after or any distilled water put in to keep the electrolyte above the plates, as this point is where the power comes from. The battery, as the main point, should get regular inspection, just as well as any part of the car.

Positive locking means, whereby tampering by outsiders cannot lead to short circuiting and discharging of batteries, will have to come, and my opinion is that this will be brought out for 1915 cars.

A movement should be started to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance. The motors are designed to turn the engines over and not to run cars as there is too much strain put on the small electric motor and also excessive draw from the battery. The running of cars by the starter were not considered when the design of starting motors was in progress.—CHAS. W. SPOHN, E.E., Mitchell-Lewis Motor Co.

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Three-Unit Combination Is Best—Allen

EAST PITTSBURGH, PA.—Editor THE AUTOMOBILE:—In reading your paper I have been very much interested in the various comments pertaining to the various electrical systems. I have given considerable thought to the different systems and have reached a conclusion which to my mind is well founded, that the combination ignition and lighting units with a separate starter will ultimately be looked upon as a standard equipment by the automobile manufacturers.

The commercial application of the electric lighting and starter for automobiles is comparatively new and it is natural to expect that before a commercial system is universally standardized, there will be introduced to the trade many freak devices, all of which may have certain virtues, but whose temporary use will be more on account of the novelty of the device than its permanentability and successful operation.

Some of your readers may take exception to the statements that the system consisting of a combined ignition and lighting unit and a separate starter is the best and will be ultimately standard, so, in order to verify this conclusion, the writer wishes to point out the following features for their careful consideration.

The system adapts itself conveniently and efficiently to the present design of engines. The lighting and ignition generators may be mounted on the magneto base without alterations. The starting unit may be conveniently mounted to drive from the fly wheel or from the crankshaft. This does not necessitate any change in the arrangement of the present engine installation or its accessories. Furthermore, the weight is distributed and the cost of installation should be comparatively small.

Compare the simplicity of the foregoing with that of a combination starter and lighting unit, the dimensions of which are larger and the weight greater, concentrating the weight at one point and a distortion of the engine installation to accommodate the same. In addition there must be the separate mounting for the magneto, resulting in a greater installation expense.

Consider now the system of three separate units which means that bases must be provided for their mounting with the result of additional cost.

A great many engineers feel that it is undesirable to combine a feature so important in the automobile as the ignition with any other device, yet if the combination ignition and lighting is carefully considered, it is clearly seen that even though some trouble is experienced on the lighting circuit, it does not interfere with the ignition. This is particularly true where the single wire lighting system is used. I believe that this feeling on the part of the engineers is very much the same as the feeling that existed when the magneto was introduced to take the place of the battery, yet today it is hard to find an engineer that would consider going back to the battery.

Thus following out the cycles of development succeeding the advent of any new device, the present developments indicates the ultimate, universal, standardization of the combination ignition and lighting and a separate starting unit.—C. E. ALLEN, assistant manager, detail and supply department, Westinghouse Electric & Mfg. Co.

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One-Unit Will Be the Eventual Type—Hunting

DAYTON, O.—Editor THE AUTOMOBILE:—We believe that eventually the starting system for automobiles will be a one-unit system which will combine ignition, lighting and starting. We are not, however, personally in favor of the ignition distributer being a part of the starter itself and operated by a shaft independent of the starting motor.

In order to keep the battery fully charged so that ample current for starting and lighting can be had at all times, a dynamo of equal size to that of a starting motor must be furnished on the car. If, then, this same instrument can be used to accomplish starting, the excess weight of the extra starting motor is unnecessary.

The ideal starting equipment is the one which best adapts itself to the construction of the engine to which it is applied, occupies the least space and whose weight is balanced most perfectly on the car. We are only in favor of a positive drive through gears or a chain.

In order to have a starting motor efficient a gear or chain is absolutely necessary, as a belt or friction drive would give more or less trouble on account of slipping. We do not believe in gearing direct to the flywheel, as this leaves the gearing more or less exposed to the accumulation of dirt. There is also more or less complication in a satisfactory means of shifting a pinion in and out of mesh with the gear teeth on the flywheel. In the Aplco system the gear reduction is entirely inclosed, so that no shifting of gear is necessary in starting, and this enables the operator to throw the starting lever on the controller as he is getting into the car and before he can be in his seat the engine is running.

Certain Weight Is Required for Efficiency

It is doubtful if there will be very much more reduction in weight after the combined starting and lighting systems are produced, as these equipments must be large enough to perform their functions and to keep the storage battery fully charged, and this requires a certain weight. Any reduction beyond this point results in inefficiency.

The position of the starting battery should be under the floor of the car, as this balances the weight best and is easily accessible by raising a panel. This, of course, might not appply to roadsters, but as a general rule we do not advocate placing the battery on the running board. While there is some development work being done along the lines of improvement in storage battery plates, it is doubtful if storage batteries will ever be made very much lighter and at the same time retain their life and efficiency.

We can only speak from the standpoint of the Aplco system in answer to this question. From the very first the controller has been under lock and key, so that it was impossible for a person to tamper with the system or injure it in any way. This also protects children from injury should they accidentally start the car by tampering with the starting mechanism.

As electric starters come into more general use the novelty will wear off and consequently there will be less of the senseless demonstrations, such as running the car by the self-starter, and less injury to the equipments on this account. From the

manufacturer's standpoint there is no advantage in demonstrations of starting motors pulling the car itself, except that every starting motor should be able to do this in extreme cases, as for example, when the car stalls on a railroad track and the motor will not start readily, the starter should then be able to draw the car out of danger. Demonstrations which show the ability of the dynamo to replace current in the storage battery rapidly and yet without injury to the system are worthy of consideration, and no system is of any value which cannot replace the current in the battery promptly so that the starting system may be available at all times and so that there may be ample current for lighting and ignition.—M. M. Hunting, Apple Electric Co.

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Three-Unit System Is Most Reliable—Manson

Elyria, O.—Editor The Automobile—From the standpoint of reliability, the three-unit system in which ignition, starting and lighting are separate, each being connected in a simple and direct manner to the power plant, appears to be best. When these three units are neatly designed and are built into the power plant so as not to look like attachments, no valid objection can be brought against the same. Each unit being independent of the other units, any trouble which might develop in one element would not effect the operation of the others, therefore promoting greater reliability. Also the fact that each of these three units are separate and are provided with separate driving means, makes it possible to simplify the circuit connections and make each unit of the most simple construction. For example, the motor can be a plain series-wound machine which is easily understood by every electrical repairman. The same can be said of the dynamo, and the ignition outfit being entirely free from the starting motor or dynamo, it will not be disturbed when looking for trouble in these other elements, and it will always be possible to run the engine regardless of any breakdown in the starting and lighting portions of the system.

The writer believes that the best method of coupling the starting motor with the gasoline motor is through suitable gearing rather than through a chain drive, although a portion of this connection may be through a chain drive if properly applied. Where the chain is used, some means must be provided for adjustment, otherwise the back lash will be sufficient to allow undue wear or an excessive strain which will soon ruin the chain or cause it to break.

Weight Bears Relation To Power Developed

Much experimenting has been done to cut down the weight of starting systems, and while the equipment has been made extremely efficient, this weight must be within certain definite relations to the power developed by the motor and the voltage of the starting battery. With a high voltage battery, the starting motor can be reduced in weight, also by greatly increasing the armature speed of the starting motor and taking advantage of the inertia of this armature or of a flywheel thereto attached, the weight can be somewhat reduced. However, this latter scheme does not allow a standard 6-volt battery to be used successfully, and as this low voltage is desirable from several standpoints, the high speed motor could not be figured as a final solution to the reduction in weight.

The battery should not only be accessible but it should be securely fastened in place and thoroughly protected by suitable covering. It is imperative that the battery be examined at least once a week in the summer time and evaporation replaced by the addition of the proper amount of water. To do this quickly and with certainty, the battery should be so located that it is possible to look directly down into the vent holes so as to observe the height of the liquid and the tops of the plates. The writer believes that the best scheme is to provide a battery box which is somewhat larger than the battery itself and to fasten the battery down with clamps. This will make a secure mounting and allow the substituting of a battery of another make of slightly different dimensions if trouble develops in the battery which is furnished with the car. With the proper design of clamps this temporary or replacement battery can be fastened in place and the car continued in service until the other battery is overhauled or a new one provided.

It is apparent that the excessive initial draw from the battery as required for starting purposes is not injurious, as many thousands of these batteries are in daily use without experiencing serious defects. The battery must be specially designed for this purpose with the grid or lead plate reinforced near the top and adjacent to the lug. Also the connections must be extremely heavy so that there will be no large drop in voltage on the three-cell batteries. This is not so important on the higher voltage batteries, although the reinforcement of the parts should be in proportion to the amount of current draw. I believe that we have the first reinforced three-cell battery of 6 volts made by a prominent battery maker, and this battery has been submitted to all kinds of abuse, especially as it has been used in connection with the testing of experimental starting motors. Apparently, this abuse has not seriously damaged the battery, as it is still in commission. We have other makes of 6-volt starting batteries which have been in use in our laboratory for shorter periods of time and which show no injury from excessive initial draw in starting service.

Locking Means To Prevent Tampering Good Idea

Your suggestion as to the providing of a locking means to prevent tampering by outsiders and the subsequent discharging of the batteries, is a feature which should be provided by every car maker using electric starting systems. It would not be a difficult matter to have this same lock control the ignition and thereby serve as a most effective lock for the car.

From an engineering standpoint, it is doubtful if any modern electric starting system has been designed to propel the car, even for a short distance. The fact that this can be done is only an indication of the reserve power of the starting motor and of the ability of the battery to furnish excessive current, which is required for the initial turning of the engine when commencing to crank under adverse conditions. However, this initial draw is momentary in character, while the propelling of the car is continually an overload on both motor and battery, and should be discouraged by both the manufacturer of the car and the dealer. In some cases the starting motor and battery have been designed so as to just care for the starting under unfavorable conditions with only a comfortable factor of safety. In such cases, positive damage would result in the propelling of the heavy car even for short distances. With a large electric vehicle type of starting motor and an extremely large capacity battery, with heavy reinforced plates, it is possible to indulge in these propelling "stunts" and create enviable records. Any advantages which can be gained by propelling the vehicle in this way are greatly overbalanced by the excessive weight of the battery and the large, bulky motor which must be employed.—R. H. Manson, secretary and chief engineer, Dean Electric Co.

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Two-Unit System Superior—Szekely

Richmond, Va.—Editor The Automobile:—For the present at least, I consider the two-unit system, that is, ignition and lighting in one unit and with the starter mechanism in a separate unit, the best. The reason is that while the motor consumes amperage in order to have strength enough to start an engine, the light requires voltage.

Regarding reducing the weight of the starting motors, there is a good rule in the technic that the higher speed the electric motor is supposed to run with, the lighter it can be made. Regarding weight, of course, that only applies while using high-speed motors, but at the same time the gasoline engine on an automobile is considered to be a high-speed motor. With 2,400 revolutions per minute it can be made about 17½ to 18 pounds in weight.—O. E. Szekely, Kline Motor Car Corp.

The Rostrum

Atmosphere Affects Engine Performance

EDITOR THE AUTOMOBILE:—Mr. Herbert Chase's article in THE AUTOMOBILE for July 24, "Is Engine Power Affected by Atmosphere?" was very interesting.

As I take it, the Packard motor under test hardly had an opportunity of showing whether it developed more power at night than in the daytime, insomuch as Mr. Chase admits that the load was continually being changed to enable the motor to maintain the same constant speed.

Some day, when you happen to be near some large power plant using large gas engines for power, drop in and ask the chief engineer if there is any noticeable change in the operation of his engines, without any apparent cause? Invariably the answer will be that the engines, practically without an exception, always work better at night than during the day, namely, they run at a more even rate of speed, with less fluctuation on the governor, etc. In fact, to the experienced eye, the engine is giving a greater degree of satisfaction than it will be doing at noon of the following day.

As for Mr. Chase's theory of people being unable to judge the acceleration powers of a car, it seems to me that anyone of ordinary intelligence, using a car more or less continually, will eventually come to know what his particular car is capable of doing, and if at night he is able to negotiate certain grades on high, that at other times necessitate a change to "second," he certainly isn't fooled, or is it possible that he shifts into second, after dark, then back into high without realizing that he has shifted gears?

McKinley Station, Kane, Pa. E. C. WHITCOMB.

Equipping a Small Garage

Editor THE AUTOMOBILE:—I am considering equipping a small garage, and I have not the capital to put in a liberal equipment. As one of your readers I would appreciate it very much if you could advise me as to what equipment you consider absolutely necessary, and the approximate cost.

New York, N. Y. H. E. SEEGER.

—If you intend to do repair work there is practically no limit to the expense to which you can go in the way of purchasing tools. You might receive ten jobs on which there will be practically no work at all except what can be done with bench tools of low price and then, on the other hand, you will often find that there will be a long succession of jobs in which a lathe or drill press will be required.

In order to be equipped for anything that should happen to turn up you should have a small lathe. A drill press is essential but can dispensed with at first if you wish to be economical and the drilling work done with a breast drill or on the lathe.

Forging work is very often necessary, and you have your choice of letting these repairs go to the local smith, who will perhaps do them for you at a low rate or of doing the work yourself at the expense of installing a gas forge and an anvil, together with the necessary hammers. A blow torch will take care of the small soldering and brazing work and it will be very well possible for you to dispense with the forge until your business had grown enough to warrant it. The purchase of tools soon runs up to such a quantity of money that the investment which at first seems small will become exceedingly high unless the tools are purchased gradually. A full outfit of bench tools is necessary before you can attempt to do even the smallest job. An assortment of spanners, socket wrenches, vise caps and dies, screwdrivers, punches, chisels, hammer and Stillson wrenches will be necessary. You should have on hand a plentiful supply of bolts and nuts, pipe plugs, tapper pins, etc., to make small replacements without having to wait until parts can be secured.

In designing your shop, attention should be paid to having it so arranged that the work can be done on cars conveniently. There should be a chain fall for lifting the motor and heavy parts, the light should fall on the work and the electric lighting line should be within handy reach, so that drop lights or extensions can be readily plugged in place.

If you are serving customers using electric lighting and starting it would be a matter of business policy on your part to have an electric charging plant by means of which the storage battery can be recharged. On this work you could familiarize yourself with the methods recommended by each of the makers for charging their batteries and, in fact, should secure specific information from each storage battery make, so that you can handle each type of battery as it comes in.

If you care to do vulcanizing work a small vulcanizer will be inexpensive and will repay you well. "Free air" is a great factor in attracting trade and the fitting of a small pump would be worth the expense entailed.

Automobile for Stationary Power

Editor THE AUTOMOBILE:—I have a 30-horsepower Buick car. I want to saw wood, using it as the power. Will you please tell me how it is done? How shall I jack the car and make it stationary? Shall I use a belt? How long and how wide? Will both back wheels have to turn? At about what speed should the motor be run? This, and any other information I will appreciate very much. A. K. BELL.

Madison, Ga.

—You may use your automobile for stationary power purpose by blocking up the rear axle so that the back wheels are off the ground and by putting a belt over each wheel. The drive then can be carried from the two wheels to a tranverse shaft on which a circular saw is mounted. A good leather belt 6 inches in width will easily carry the work which you require. The greatest feature is to line the work up correctly with the drive so the belt will not continually slip off the wheel. If the alignment is right there will be no tendency for the belt to leave the wheel unless there is a wabble in the rear wheels. In lining up the driven shaft the distances from center to center in the driven pulleys should be 56 inches. The length of the belt of the center distance between the driving and the driven pulley can be made practically whatever you desire. A distance of 10 feet from center to center as a minimum would be advisable in order that there will be plenty of clearance to work about the car. Another point which should be carefully considered

is that the tension on both belts will have to be the same or the differential will not permit the same amount of work to be transmitted to both sides.

It will be better to have the power transmitted to both back wheels, for then they turn at half the speed that would be the case with one wheel and the load on the bearings, axles, etc., is symmetrically distributed instead of being entirely on one side.

The speed at which the motor is run will depend altogether upon the work which has to be done in just the same manner as would be the case when driving the car. If there is a heavy load on the saw the motor can be used in second or first speed, while if the work is light it will be more economical to run it on the high gear. The size of the saw you use will have a material effect on the speed at which you can run the motor.

Displacement of Fours and Sixes

Editor THE AUTOMOBILE:—Advocates of the four-cylinder type of automobile gasoline engines claim, in comparing a four and a six of the same piston displacement, that the six has much greater cylinder surface than the four; in fact, about 10 per cent. more.

1.—Will you kindly give me the dimensions of the cylinders of both a six and a four of equal piston displacement?

2.—Kindly give me the formula for computing the piston displacement.

3.—Kindly give me the formula for computing the horsepower of any gasoline motor. M. MEAD.

Meadville, Pa.

—1.—There can be any number of motors of four and six-cylinders having the same piston displacement whose dimensions, that is, bore and stroke, will be different. The area of the cylinder bore times the length of the stroke gives the piston displacement for each cylinder. It is evident, therefore, that the product of the area and stroke can be the same although the factors themselves will vary in the same manner that the product 32 may be arrived at by multiplying 8 by 4 or 16 by 2. Assuming a four-cylinder motor of 194.8 cubic inches piston displacement, we find that this motor should have a bore of 4 inches and a stroke of 4 inches. In order to have a six-cylinder motor of 194.8 cubic inches displacement each cylinder would have to have a displacement of one-sixth of this, or 32.46 cubic inches. Assuming the stroke to be 3 inches, the bore area would be 10.82 square inches and the bore would be 3.72 inches. In other words, a six-cylinder motor having a bore of 3.72 inches and a stroke of 3 inches would have the same piston displacement as a 4 by 4-inch four-cylinder motor. A six-cylinder motor having a stroke of 3.5 inches and a bore of 3.43 inches would have also the same piston displacement. These dimensions may vary out in the hundred place on account of the fact that the numbers worked with are not perfect squares, but will be close enough for all practical purposes.

2.—Piston displacement may be calculated by the following formula:

$$\text{Displacement } D = \frac{d^2 \times 3.1416}{4} \times n \times S.$$

In this equation d is the bore; n is the number of cylinders, and S is the stroke.

3.—The accepted formula for calculating brake horsepower is as follows:

$$\text{b. h. p.} = \frac{d^2 n}{2.5}$$

In this formula, d is the diameter or bore, n is the number of cylinders and 2.5 is a constant for automobile motors.

Checking Small Rattles Easily

Editor THE AUTOMOBILE:—It is very difficult to keep a car free of small rattles when taking a long tour over rough and bumpy roads. On a recent trip through the Adirondacks I returned with my car completely covered with small wedges which I put in position from time to time as rattles and bumps developed. I found that this method of silencing small noises was very efficacious and added greatly to the pleasure of the tour by removing many noises which grated on the ear after a time. The wedges used were just small pieces of wood picked up by the roadside and such as are shown in the sketch, Fig. —. TOURIST.

Montclair, N. J.

Making Permanent Hose Repair

Editor THE AUTOMOBILE:—I found that a repair on radiator hose made by winding tape about it cannot be depended upon from the standpoint of long life. In other words, it is one of those repairs that will suffice to get you home safely but which will not go far beyond this. A short time ago I noticed that the hose at the bottom of the radiator was leaking rapidly around the clamp. In order to keep the water in the radiator I drained all the water out of the system and carefully dried the hose in the neighborhood of the leak, washed it with gasoline and then tightly bound it up with tire tape. This held so well that I thought it was a permanent cure, but finally I found that the tape peeled off and in some way got tangled up in the fair belt and the result was that it was all ripped from the hose and I had considerable trouble getting the tape untangled from the fan blades. Is there a better way of making this repair? INQUIRER.

New York City.

—As soon as you reached home you should have purchased a new piece of hose, slipped it on and fastened it with hose clamps. The contrast between the two methods is plainly shown in the illustrations at the head of this department. The reason that the tape will not last around the hose connections is that oil is thrown up on it and soaks into the tape, destroying its adhesive qualities. It will then soon strip off and will allow the hose to leak. The only proper course of procedure is to install a new hose with clamps that are tightly fastened.

Using the Motor as a Brake

Editor THE AUTOMOBILE:—In descending a steep hill in an automobile, with the first-speed gears engaged, do you get more braking power from the engine with the spark cut off or with the spark on and the engine under power?

New York City. GEO. C. STEVENS.

—In using the motor for a brake with the gears in first or second speed more braking effect is secured by having the ignition off. Besides this, backfiring and muffler explosions are to a large extent avoided and the motor is more completely cooled at the same time that it is working as a brake. When the spark is on there is an occasional impulse given to the motor by an explosion occurring in the cylinders, even though the motor may not fire at all regularly. In working through country hilly enough to require the services of the motor in low gear as a brake it is a good opportunity to cool off the motor by cutting off the ignition. The cool air which is drawn into the cylinders will quickly reduce the temperature of the cylinder walls.

Jammed His Gears on a Hill

Editor THE AUTOMOBILE:—Saturday afternoon I saw an automobilist in trouble and I went over and asked what the trouble was. He said: "I was just trying to make a hill and had my speed gear in first speed, and when trying to go up could not get it out of first." The engine knocked so that he had to stay there until some one towed him back to the city. There was a good mechanic there, and he said he did not know what the trouble was after working at it for about half an hour. Will you kindly tell me what the trouble was? L. BRUMOND.

West Hoboken, N. J.

—Cases of jammed gears occur very frequently and they are of different causes. The design of the gearbox has so much to do with the trouble that it is impossible to state the exact cause without knowing the make of car. A bent layshaft or a bearing thrown out of line in the gearbox owing to sudden strain, such

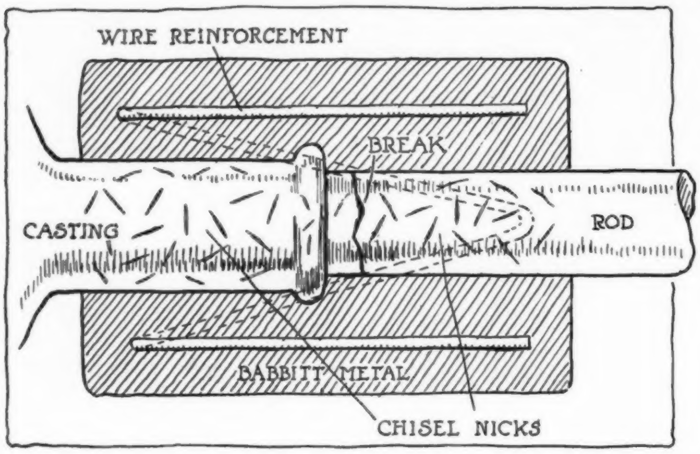


Fig. 1—Repair with babbitt on broken drag link

as going into low after it is too late or even after the car has started to run backward will often be the cause. Again different parts in the gearbox will be thrown in such a way that they will overlap one another so that it will be impossible to withdraw the gears. It is impossible to give the probable cause unless the name of the car and year of its manufacture are known.

Makes Another Camphor Inquiry

Editor The Automobile:—I have been told by several people lately of the very good results obtained by dissolving gum camphor in gasoline. By the use of 1 ounce of camphor to each 5 gallons of gasoline, it is claimed that much greater power is secured and at the same time, a higher mileage per gallon. I have heard it stated that as much as 3 miles more per gallon have been obtained in this way. Can you tell me if this is good practice, if the results claimed may be reasonably expected, and whether or not the use of this solution of camphor and gasoline would have any bad effect on the carburetor or engine?

Lawrence, Mass. George H. Gage.

—In the last issue of The Automobile the Rostrum explained the action of camphor. As there are so many inquiries lately on this subject, the advice may be repeated: Camphor carbons the cylinders and is also apt to rust them unless they are amply protected by copious lubrication. Picric acid attacks the cylinder wall, as does ether also.

A few weeks ago the Automobile Legal Association of Boston, Mass., sent out a notice, a reprint from *The Motor* of London, telling of results from using camphor in gasoline, leaving it to the members to try it or not, but asking for a report. As a result of this, reports began to come in and the association has just sent out the following statement relative to the matter: "During the past week we have had a great many reports from our members concerning camphor in gasoline, and all report that they have carbonized cylinders as a result of its use, and that the slight gain in power has been more than offset by the disadvantage of carbonizing. The use of camphor in gasoline therefore cannot be recommended."

Special Flux for Aluminum

Editor The Automobile:—I wish to solder a small piece of aluminum to the aluminum base of my crankcase. I understand that soldering aluminum is accompanied with difficulties which are rather severe on an amateur, and in fact that unless special care is used that it is almost impossible to get a good job. If you could tell me how to mix a good flux, I would be much obliged. Reader.

Neponsit, Mass.

—The soldering of aluminum has not as yet been perfected, although fairly satisfactory results have been obtained. Repairs made by the oxy-acetylene and electric welding processes, however, are highly satisfactory. A receipt which has been used to advantage in Germany is as follows: Tin, 80 per cent., and zinc, 20 per cent. The flux consists of 80 parts of stearic acid, 10 parts chloride of zinc and 10 parts of chloride of tin. A solid nickel soldering iron should be used, so as not to discolor the metal.

A Quick Drag Link Repair

Editor The Automobile:—Before the present one-piece and other improved designs came into use the breaking of automobile drag links was a common ailment, the break usually occurring at the weak-threaded part where the rod screws into the casting. These breaks still occur in the old types. A quick repair is possible and in a recent case I proceeded as follows: I saw that I could easily extract the short stub from the casting and was equally sure that by using a lathe I could turn the exact thread needed on a new rod and make the repair permanent, but since he was in a hurry and I saw a quicker way to make a good temporary repair I took another course.

Babbitt metal being one of my favorites for making repairs I again saw my chance to use it here. Pictures of soft metal cast around the ends of wire cables to enable testing machines to get a true, uniform grip on such cables for testing their strength came to my mind. I also recalled what some one had told me about the method of fastening the ends of the large wire cables that are used in the Brooklyn Bridge and other suspension bridges. Surely the bond between lead and steel or babbitt and steel is not to be sneered at. I could see no reason why babbitt wouldn't do the trick in this emergency. To make my method of repair certain I then nicked the rod and casting with a cold chisel and hammer at the ends, as indicated Fig.—, so that there could be no possibility of twisting or pulling out. I believe nicking would have been unnecessary, but to this day I have been unable to learn much about the bond between babbitt and embedded steel. It seems there is little data on the subject. I didn't attempt to remove the end of the rod from the casting in which it still remained. I didn't even move it. I clamped the rod in a vise, pressed the broken end against the rod to match its exact original position and rigged up another vise to hold the end rigidly in place, then fabricated some "steel reinforcement" out of common wire that was easily bent to shape by hand, and placed this reinforcement around the rod directly about the break. After building a rough moist sand mold around the joint we then poured in some molten babbitt and the job was complete and in need of no adjustment before replacing in the car, although I will admit it did not look like a first class job. The mold was exceedingly rough and unsymmetrical, but I was quite certain that I had used enough metal.

Babbitt is of much greater value for emergency repairs than is believed or known to the average repair man or motorist. It is a fact that it is little used in that way. Certainly the method just described could just as readily be applied to a plain rod broken through the middle or almost anywhere else. Although it has its acknowledged limitations it can be used to strengthen a weakened, bent rod; it can be used for mending castings; sometimes it is useful in stopping leaks; and it would come in handy in an almost limitless number of ways if the automobilist would only carry a generous supply in his tool chest, accompanied by the necessary blow torch and ladle. A mold for babbitt can be made almost anywhere at the roadside of sand, dirt or other non-combustibles. W. T. Schaphoist.

Brooklyn, N. Y.

Knock Due to Loose Bearing

Editor The Automobile:—I have a 1911 model T Ford which has been run about 15,000 or 18,000 miles, and which has developed a knock, or rather a very loud tap. I have been unable to locate it, nor can I find anyone that can tell what causes it. It seems to be getting louder right along. The tap does not occur when the spark lever is anywhere above the seventh notch, but when you advance the spark any further than that, the tap-

ping begins, and the more you open the throttle or the harder it works, the louder it taps. I have had the engine thoroughly overhauled, new rings put on pistons, crankshaft and piston rod bearings tightened up, valves ground in, and valvestems drawn to proper length, all carbon removed, and carburetor adjustments made, but it still has that loud tapping. Can you tell me the cause and remedy for same. I have had the machine to several good garagemen, but none of them seem able to tell what causes the tapping, which sounds like tapping rapidly on the cylinder head with a very light hammer.

Valley Centre, Mich. A. H.

The trouble is probably due to a loose bearing. A burnt out bearing on the crankshaft or a loose wristpin will give this knock and will also coincide with the sympton you mention in that the knock is worse while the motor is laboring under a load. You will not be able to cure the trouble without taking the motor down and going over the bearings one by one. A new bearing can be purchased to replace the worn one and the cure could be effected.

Wants Old Race Results

Editor The Automobile:—Would it be possible to learn through the Rostrum the results of the 200-mile race held in Columbus, O., on September 3, 1911? I have had quite a controversy as to the amount of interest displayed in this race as shown by the attendance, who were the entrants, what the prizes were, and what time was made. Kindly give us full particulars of this race if you have any record.

Columbus, O. Race Enthusiast.

—A crowd variously estimated at between 25,000 and 28,000 attended the 200-mile automobile race held under the auspices of the Columbus Automobile Club at the Columbus Driving Park Sunday, September 3. The race was one of the most successful in the history of automobile racing in Ohio and several records on a dirt track were broken.

Lee Frayer in a Firestone-Columbus went one of the miles in 54 seconds flat, which was a record in a contest on a dirt track. The time of Harry Knight in a Westcott, who won the race handily, was 3:45.00 flat.

There were three cars which finished the 200 miles out of the eight starters. Jackson No. 2 car driven by Max Borst and entered by J. P. Adamson, the local Jackson dealer, finished in 4:15.00 flat, while Jackson No. 1 driven by John Borst, a brother of the other Jackson driver, finished just 1 minute later, the time being 4:16.00.

The starters in the race were: Jackson, driver John Borst, entered by J. P. Adamson; Jackson, driven by Max Borst, entered by J. P. Adamson; Cino, driver William Fritsch, entered by Haberer & Company; Ford, driver W. G. Lake, entered by Ohio Auto Sales Company; Marquette-Buick, driver Frank Lawwell, entered by Leyman-Buick Company; Westcott, driver Harry Knight, entered by the Westcott Motor Car Company; Firestone-Columbus, driver Lee Frayer, entered by Lee Frayer; Cole, driver G. Morris and John Jenkins, entered by Cole Motor Car Company.

The race was a sweepstakes with the purse of $1,000 divided into three moneys, viz., first money, $500; second money, $300; third money, $200. In addition, the winners of the first three places received valuable trophies in the shape of loving cups.

The start of the race was made at 1:40 p. m., with the cars going at an estimated speed of 30 miles per hour. The lead was at once taken by Leo Frayer in the Firestone-Columbus, who kept it until the eighty-sixth mile when the car skidded while making a curve and went through a fence. Frayer was pinned under the car and was taken out after some trouble. He was not seriously injured and is expected to be around in a few days. The car was put out of commission by the accident which cannot be accounted for by Frayer.

The Westcott car driven by Harry Knight then took the lead and held it until the end.

Magneto Versus Battery Ignition Systems

(*Continued from page 379.*)

to examine accurately the action between the contact points when the magneto is in motion. It also results in a serious drawback, namely, that it is very difficult to make adjustments to the points or other parts of the interrupter, or to clean the points if necessary.

In the construction shown in Fig. 7 the contact points are stationary and can be reached and adjusted with the greatest ease. The ignition device, including interrupter and distributer, is a unit in itself and can be entirely removed from the machine if necessary. The parts are all simple and any one of them could be made in the ordinary repair shop if necessary in an emergency. Moreover the outfit is so simple that it is understood almost at a glance.

One possibility that is sometimes urged against a system of this character is the fact that on account of a short circuit in the wiring the battery may be discharged and it may be impossible to start the engine. This, while possible, is hardly probable. Unless the short circuit had continued a long time the voltage would in general soon recover enough after the short circuit was removed to supply sufficient current for starting. If there are two volts or more available, starting can be accomplished and the generator will quickly recharge the battery. If it is desired to make provision against the possibility of failure of current it is an easy matter to add a battery of dry cells to the outfit, thus providing a reserve source of current. At worst the possibility of this happening is far more remote than the possibility of the dry cells used for starting with magneto systems being exhausted and starting being in consequence impossible. The best safeguard against this happening is, of course, the equipment of the car with proper wiring, adequately protected against the possibility of mechanical abrasion. There is little or no possibility of breakdown due to the voltage of the wiring as this latter is so low. A thickness of even .001 inch of the usual insulating materials will withstand a pressure of from 300 to 1,000 or more volts. It will be apparent that breakdown cannot occur unless there is actual metallic contact.

To sum up, the constant voltage ignition is superior to magneto ignition in that while it will give an adequate spark at high speed the intensity of the spark increases as the speed decreases, becoming maximum when the motor is barely turning over. The heat of the spark throughout the working range is far greater than that of the usual magneto spark, the timing range is unlimited in contrast to the limited range of the magneto and the intensity of the spark is the same irrespective of the point at which the spark occurs. The mechanical reliability is greater and accessibility is greater than that of the magneto.

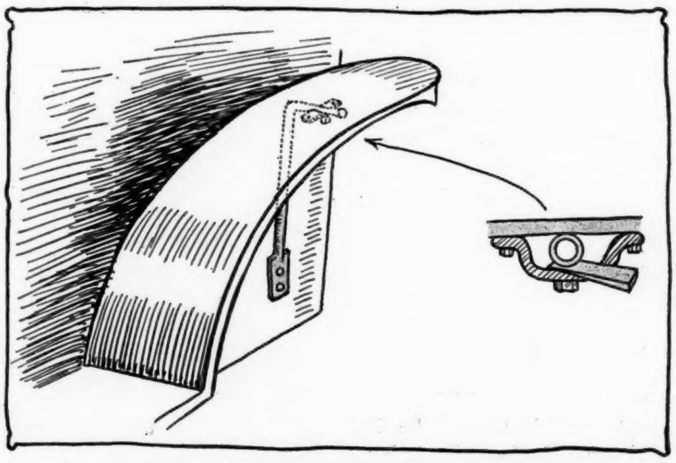
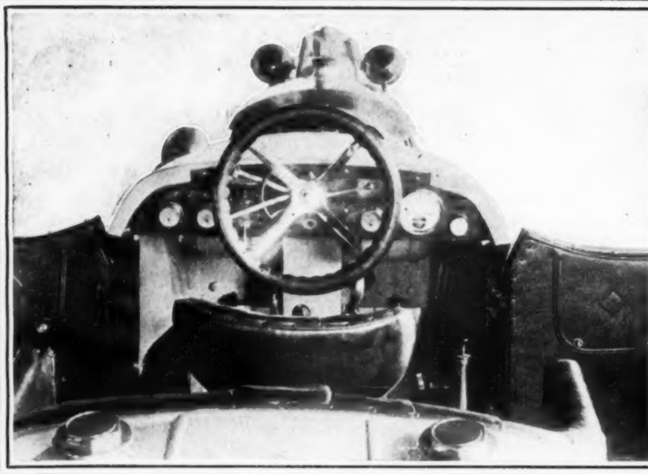
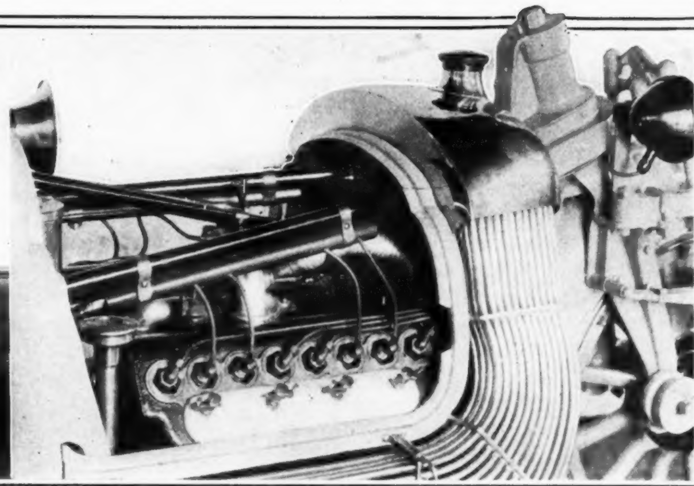


Fig. 2—Wedge will temporarily stop an annoying rattle



Looking forward on the Biautogo, showing seats



Right side of the eight-cylinder motor

The Biautogo—A Motorcycle Car

Detroit Man Designs Strange Vehicle Which Runs on Two Wheels at Speeds Above 20 Miles An Hour —Inventor Claims It Can Make 75 Miles Per Hour—Has Eight-Cylinder Motor

IT is doubtful just what form the sportsman's motor car of the future will take, for the man of means soon tires of the conventional and with automobiles as with everything else he is constantly looking for something different. Think of the duck boat, whaleback and other unique body designs which have appeared here and abroad, built according to the ideas of motorist sportsmen.

It was with this attitude that James Scripps Booth, of Detroit, several years ago set out to design something propelled by a gasoline engine which would be out of the ordinary. The idea of developing a strange vehicle such as that pictured here which Mr. Booth has christened the Biautogo long ago was held by him, the first sketches being dated at Paris about 3 years ago.

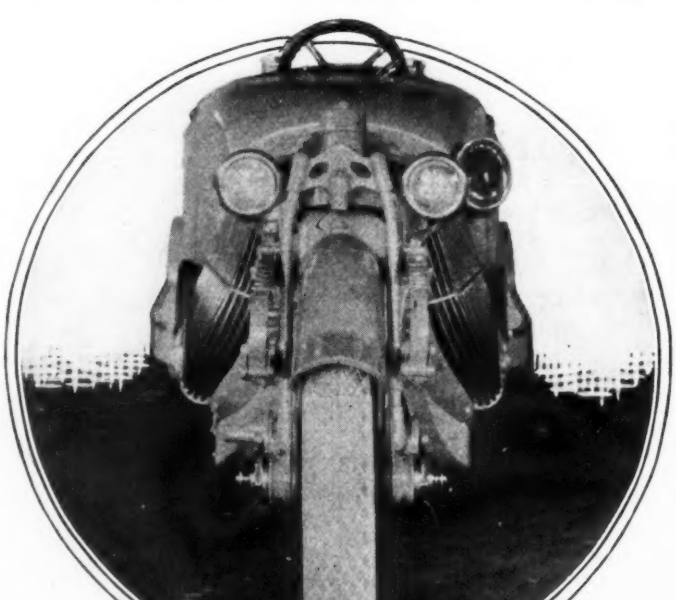
The Biautogo was not developed primarily with the idea of placing the vehicle on the market for general sale, although Mr. Booth had made at the same time a duplicate set of parts complete so that another identical vehicle could be assembled. It was intended to exhibit the machine, which is really a cross between a motor car and a motorcycle, at last year's national automobile show in New York, but it was impossible to complete it in time for that exhibition.

However, the vehicle has since been completed in excellent style and presents a most finished appearance throughout. At first glance, even the veteran automobilist who can spot any model of any make of car will be at a loss to tell just what he is looking at. In fact, the design is so absolutely unique that one feels that he is gazing at something out of a fanciful writer's works. But after he pinches himself a few times, he realizes that he is gazing at something new in the automobile field.

The Biautogo is a machine mounted upon two large wheels and has two smaller balance wheels on the sides which are pressed into service at low speeds. When traveling above 20 miles per hour these small side wheels may be raised, when the car balances on its two main wheels just as a motorcycle or bicycle balances.

The seating capacity is three persons—the driver sitting forward of the main double seat. This driver's chair is hinged to swing forward to admit the rear seat passengers. The steering wheel passes through the dash board on which the various gauges are attached. The wheel is in the center as are the control levers, the driver sitting astride of them. The control is standard with the exception that the clutch and service brake pedals are in reverse position as compared with the conventional car, the clutch being to the right of the brake pedal. Besides the regular brake and gearshift levers, there is a third lever which operates the side balance wheels, an eccentric mechanism making it possible to raise them about 4 inches.

The motor is an eight-cylinder, V-constructed block-cast type, designed throughout by Mr. Booth and having a horsepower of about 45 with 3 1-4 by 5 inch cylinders. It is an L-head, and there are two main crankshaft bearings as well as four lower connect-

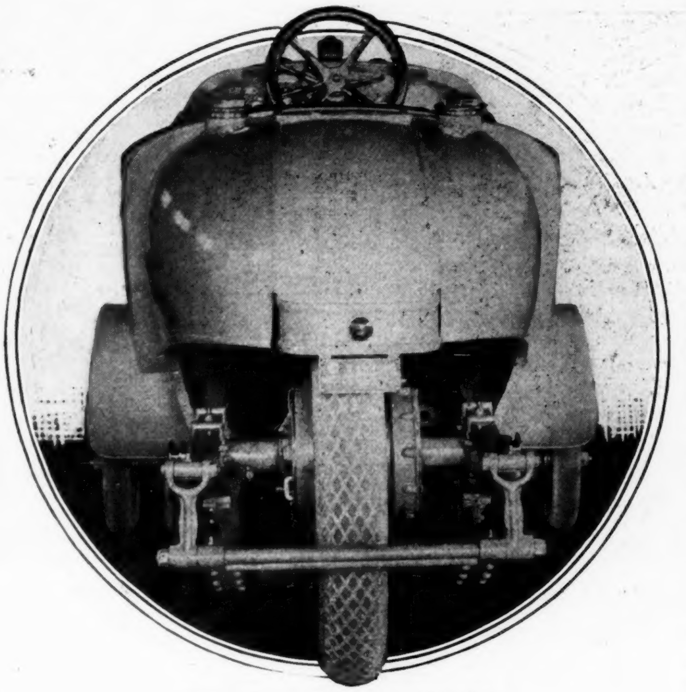


Front view of the Biautogo, with side wheels raised

ing-rod bearings, one set of rods connecting to the other set at their lower ends through integral bearings in the first set. Thus only one set of bearings actually connecting with the crankshaft are needed, and with this arrangement, the pistons really work in tandem, so to speak.

This two-bearing crankshaft is drilled for oil, a pressure pump sending lubricant through the shaft and to the lower side of the bearings. Valves in this Booth engine have a clear opening of 1 3-8 inches and are set at an angle of 12 degrees to the cylinders. Another crankshaft feature is the fitting of a ball thrust bearing which takes the side thrust off the main bearings.

The carbureter feeding to a double intake manifold is mounted in the V between the two parts of the cylinder casting, while a Bosch dual magneto sticks through the dash at the rear of the motor and is accessible from the inside of the car by the removal of a plate which covers it.



Rear view, showing suspension

The machine carries an air starter, the pressure for which is produced by a Kellogg air pump which sends the air to two storage tanks under the dash shroud. The air distributer is driven off the camshaft while there are check valves on the cylinders. If necessary to crank the motor by hand, this can be done by the insertion of a hand crank in the right front side, where a shaft connects through bevel gearing to the front of the crankshaft.

Besides this starting system there is a Gray & Davis generator which produces current for the lights. This generator is slung on the side of the gearcase and is driven by a silent chain from the shaft.

Back of the 12-inch flywheel there is a 10-inch cone clutch of standard type lined with Raybestos. The four-speed gearset is also of standard design and by its position directly under the driver's seat is easily reached by the removal of the floor board. The gears are oiled effectively by the Renault system. An oil pump driven off the rear end of the countershaft sends oil through a tube to the point of mesh of the several sets of gears, placing the lubricant constantly where needed.

At the rear of the gearcase there is a bevel gear and pinion driving a shaft at right angles to the main shaft. On this cross shaft there is a sprocket over which a Whitney roller chain passes, conveying the power back to the rear wheel shaft. This driving chain is completely inclosed and runs in oil. The reduction from the main shaft in the gearset to the rear wheel is 3 1-2 to 1.

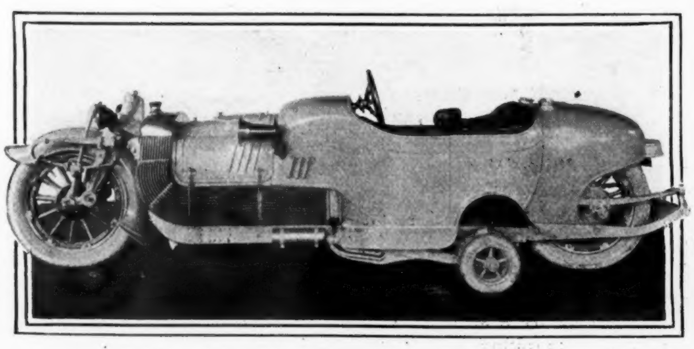
Perhaps the most original feature of the whole construction is the radiator, which is made up of banks of copper tubes on either side, following the frame from the front to the rear of the power plant. There are two water tanks, one at the front which has a filler cap and the other at the rear. The water flows from the front through an upper series of tubes to the rear tank and thence returns to the forward tank through the rest of the tubes. From here it flows by gravity to the pump for recirculation. To make this cooling device 450 feet of 1-2-inch copper tubing was required.

The front wheel is carried within a steering fork of generous proportions and the front springing is obtained through a seven-eighths elliptical spring and leverage arrangement similar to that used on motorcycles, though on a much larger scale, of course. The steering head is of bronze and the turning of the front wheel is accomplished through the use of roller chain and bevels at the steering rod end and at the steering head.

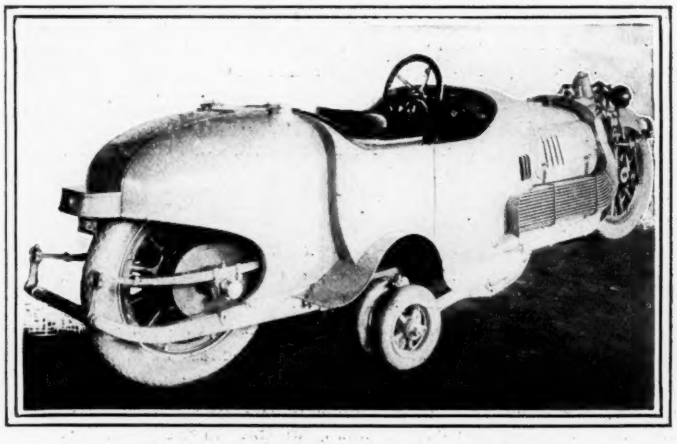
Rear springs are half elliptic and the rear axle shaft is slung from its springs. The rear of the frame has a true underslung construction, as the side view will bring out. To maintain wheel squareness, the main front and rear springs are tied together across the car in such a way as to compel uniform action at the same time.

Obviously some method for the demounting of the wheels for the changing of tires was necessary and while it is easily seen that there is not much of a trick connected with the taking off of the front wheel, the rear presented some difficulties which had to be surmounted. As designed it is a simple matter to remove the rear wheel. In the first place, the rear of the body raised to clear the wheel, then four detaching bolts are taken out at the hub and after the removal of the hub cap on the opposite side, the axle shaft may be readily driven far enough through to free the wheel. The axle might be called floating since this removal of the shaft does not disturb the sprocket or chain.

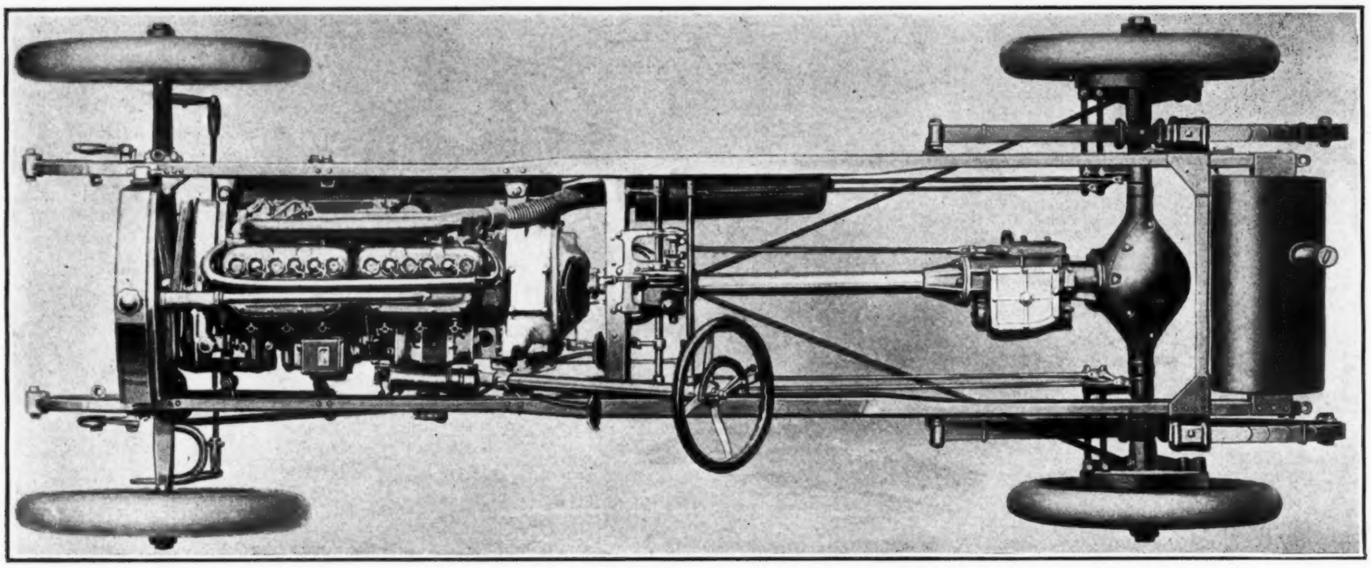
Gasoline is carried in two separate tanks, one on either side at the rear. These are of equal capacity and there are two of them.



View of left side, showing cooling water pipes



Right side, showing rear construction



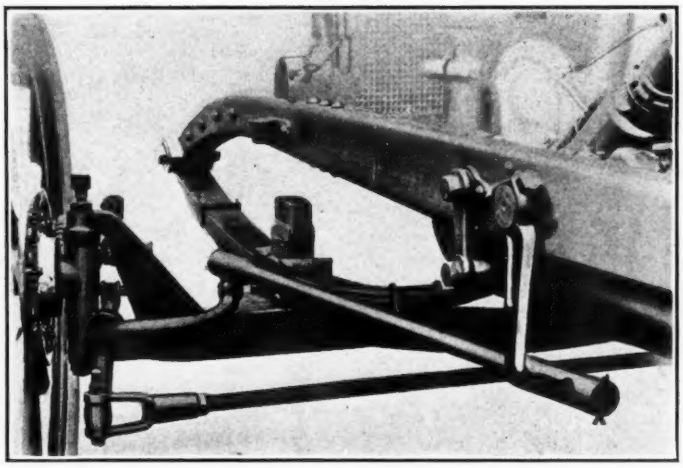
Plan view of six-cylinder Marion chassis, showing application of Westinghouse starting and lighting system

Marion Brings Out a Six

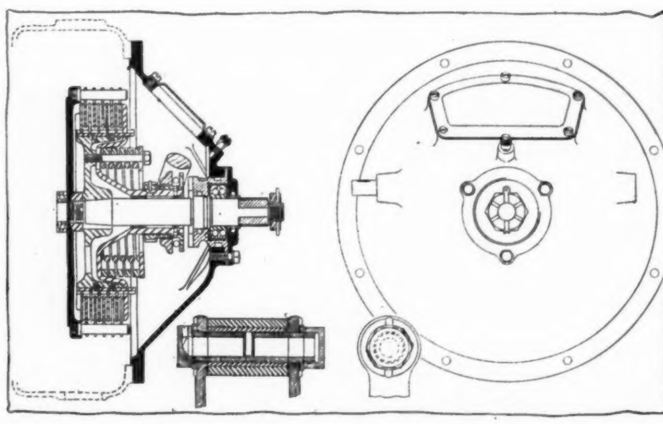
Motor Develops 54 Horsepower at 2,000 Revolutions Per Minute—Valves Are All On the Right Side

THE latest among the sixes to appear on the market is the new Marion Six. Conversion of this company to the six-cylinder field was announced in these pages last week and the details of the new car, which is the first six-cylinder product of the Marion company, are now at hand. The new car is known as the Marion Six and comes in four body types, fitted to the same chassis. These body types are a five-passenger touring and a two-passenger roadster at $2,150. Also there are a four-passenger coupe aud a five-passenger sedan.

The six cylinders of the motor are of the L-head type and are cast in threes. The cylinders have a bore of 3.75 inches and a stroke of 4.5 inches, putting it in what usually is termed the long-stroke class. It has a catalog horsepower rating of 50, and it has shown 54 horsepower at 2,000 revolutions per minute on the block, according to the maker. Intake and exhaust valves are on the right side of the motor and the valves are inclosed by quickly removable plates, each of which expose the valves of all three cylinders. The timing gears have spiral teeth, but the shaft driving the pump first and then the electric generator is operated from the crankshaft through a silent chain. Water is circulated in large waterjackets around the combustion chambers and valves by centrifugal pump, and the draft of air through the honeycomb radiator is assisted by a pressed steel fan. The adjustment of the fan for slacking in the fan belt is through an eccentric mounting which permits the fan-bearing center to be moved farther away from or closer to the pulley on the camshaft.



View of the forward spring suspension, showing steering knuckles



Section through the clutch and rear view of housing. Center, detail of spring bolt

Breather Pipe Is Eliminated

A novel feature in connection with the lubricating system which is a combination of pressure feed to the three main bearings and automatic level splash, is the elimination of the conventional breather pipe. The crankcase compression escapes through openings directly into the valve mechanism pockets in the cylinder castings carrying with it an oil mist that thoroughly lubricates this mechanism. Breather holes in the valve cover plates relieve the pressure in these pockets, so that in reality this arrangement simply means utilization of the oil that formerly was wasted by being carried off through the exit direct from the crankcase to the open air. This means a considerable saving of oil.

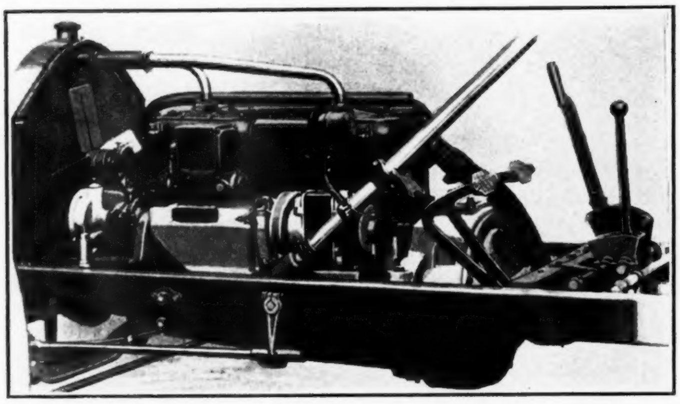
Ignition is by Splitdorf magneto and the carburetion by Rayfield carbureter with a hot-air pipe to assist in vaporizing the lower grades of gasoline. The fuel tank is hung under the rear of the chassis and gasoline is fed to the carbureter by pressure maintained by a small pump operating from the camshaft.

The electric cranking and lighting equipment is of the Westinghouse make embodying a generator driven off the pump shaft

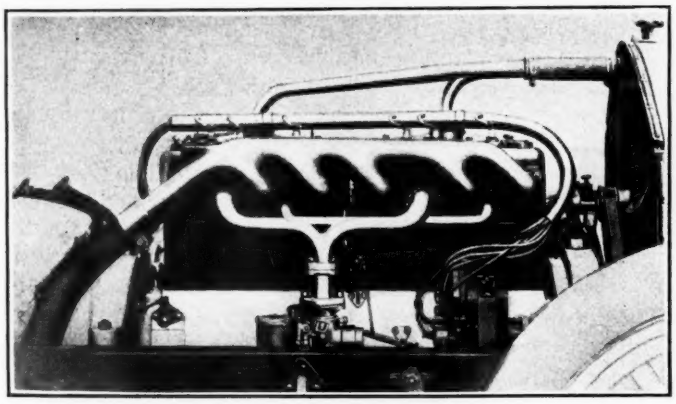
and a motor operating through silent chains on the crankshaft. The system is of the six-volt type. In the flywheel is the dry disk clutch of raybestos and steel faces. There are ten driven and nine driving plates. The motor and clutch forms a unit suspended at three points. It is swiveled to arms at the middle of the front cross member through a trunnion, which forms the single front support, while the rear points of support are bolted to the side frame members. The triple casting of the cylinders has permitted some rather unusual arrangements in the way of magneto, carbureter, and water connections. With the steering wheel located on the left side and the carbureter and magneto on the right side, the space between the two triple castings is utilized for the carbureter and magneto connections. Also this space is employed to carry the lead from the water pump to the right side where it branches to the cylinder casting.

Exhaust gas is led from the exhaust manifold to the muffler through flexible tubing.

Considerable care has been taken in arrangements for easy and quick adjustment about the motor and clutch. For instance, there is provided a hole in the housing at the rear of the motor to permit the insertion of a tool for adjusting the rear end main bearing. Likewise a hand hole for clutch adjustment is provided. From the clutch power is transmitted through an inclosed propeller shaft to the covered gearset on the rear axle. The gearset provides three speed forward and the gear faces are 1 1-8 inches. The forward end of the torsion tube inclosing the propeller-shaft is swivelled to the central cross member of the frame through a yoke mounted on trunnions. In connection with it distance rods are used. Just above the yoke and mounted upon the same cross-frame member is the centrally located lever operating the gearshift as well as that for the emergency brake.



Left side of Marion Six motor, showing center control



Right side of motor, showing clean design of manifolds

The axle is of the floating type and instead of the usual dog fitting into the hubs of the rear wheels a live shaft in the axle is finished with a deep flange that bolts on the wheel itself. Thus there is no chance of lost motion in transmitting power to the wheels. The rear system as a whole, with the gearset case bolted to the differential housing, is used because it is believed it offers the advantage that the long driving shaft and universal joints is relieved of practically all strain except the torque of the motor, while the final driving load is carried by a short and sturdy shaft direct from the transmission gear to the drive pinion. The gear ratio in the rear axle is such as to give 3.75 to 1 on third or direct drive. The gears and shafts both in gearset and rear axle are 3.5 per cent. nickel steel and all bearings are Hyatt roller bearings.

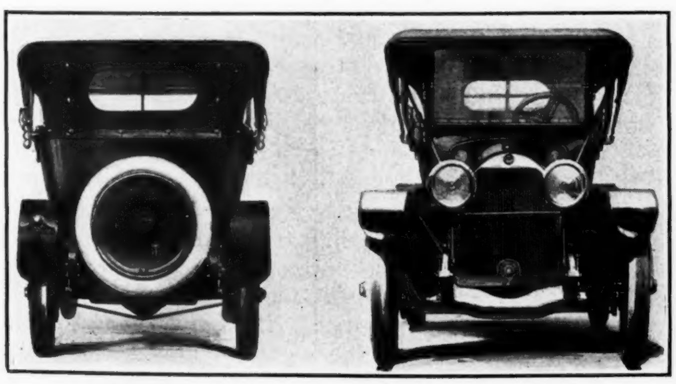
No Grease Cups on Spring Shackle

One of the points which show the careful attention to detail is the elimination of the grease cups on the spring shackle. Instead of grease cups the shackle bolts are made hollow and act as oil reservoirs with wicking to lubricate the bearing surfaces. By the present arrangement the oiling of the spring shackle, which as stated, is required not oftener than every 2 months, means simply the removal of a small screw which covers the oil hole. A contemplated change for the sake of handiness is the provision of a cap that may be removed by the fingers.

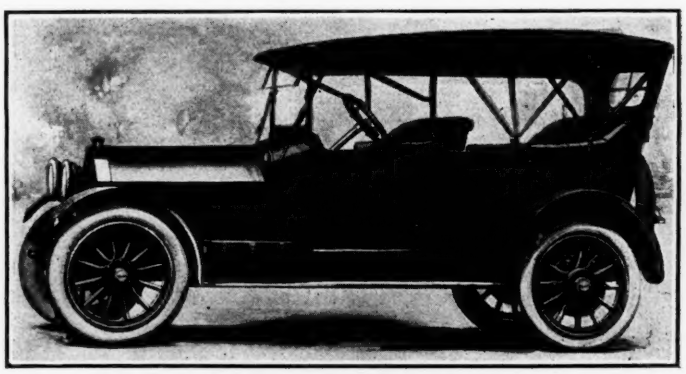
Another of the details of refinement is the rubber bumpers set in to the under side of the frame, replacing the bumpers usually placed on the rear axle as an after-thought.

Another innovation for the Marion company is the adoption of the left-side drive in connection with the center control. This latter feature has been a Marion practice for some time.

The lighting and ignition systems, ammeter, gauges and other control and indicator instruments are placed on an instrument board just far enough under the cowl to protect it from the weather. In general the tendency in the body construction has been toward straighter lines except for the slight bell shape at the rear and for roominess. The fenders follow current practice in being smooth pressed steel and have the deep lip that has been found necessary to prevent the body from being scarred. In the matter of equipment the car seems very complete, including a Stewart 60-mile speedometer, Truffault-Hartford shock-absorbers, robe rails, foot-rests, etc., and one appreciated by the driver is a gasoline gauge on the tank. Electric lighting is conventional, except that the headlights are mounted upon straight vertical rods which carry them higher than usual; the side lamps are inset in the dash.



Rear and front views of new six-cylinder Marion



Side view of the new car, showing large tool box

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The Reason Why!

THE American Locomotive Co. has abandoned the automobile field and by this act has acknowledged its incapacity to cope with problems met and answered by scores of manufacturers who began without the prestige of great antecedants, but who have succeeded from clear calculation of the conditions governing the case. It is another case, not at all new in the automobile manufacturing business, of assumption that a general knowledge of manufacturing conditions furnishes elements of success in a highly specialized field, forgetting that this is an age of specialists and that the automobile in the form of its present fool-proof simplicity is the most highly specialized product of modern engineering. Locomotive building has no doubt reached a high stage of specialization, but the problems of the automobile involve all the complications of the locomotive, to which must be added the road-bed, track and right of way. **It is not the first time that the shadow of reflected greatness has obscured the vision of a great institution, and caused it to stumble over its own egotism.**

To further imagine that a foreign production could be made the basis of a successful enterprise without serious and extended experiment and adaption to American conditions, and to ignore the fact that our successful manufacturers who have survived the influx and exodus of a swarm of famous producers, began without a knowledge of the conditions as they existed, and formed their theories on successful and extended experiments, is to belittle the undertaking, and to minimize the importance of the work in hand.

To finally attempt the survival of the business by serious price cutting was the final folly, only to be answered by a complete acknowledgment of incapacity by the total abandonment of the enterprise.

That this acknowledgment of inefficiency in no way reflects the conditions of American automobile building is a patent fact to all who are cognizant of the substantial development of this great and growing industry. **The millions invested in the automobile industry are as safe and prolific as in the production or operation of railway locomotives, and the hundreds of thousands of men employed by this industry are as substantially located and better paid than in any other producing proposition.** The railroads today must adapt themselves to the automobile, the mountains will not come to Mohammed, and commercial and financial enterprise must not be disturbed by the failure of an effort to carry water on both shoulders.

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There are three elements of success in business; first you must have a proposition that is right; second, you must have men to execute it; third, you must have money to finance it. With all three success is inevitable; with any one lacking, failure is a certainty.

In the automobile industry the proposition is the car, the passenger vehicle or the truck. There is a market for either but they must be according to the needs of the moment. If the public is clamoring for a $3,000 machine a $7,000 one is impossible; in other words, the first essential, the proposition, is lacking. Failure tells the story. You may have the finances of two dozen of the best money houses in the country, you may have big engineers, big production men, but they avail but little. The triple chain lacks the one link, the proposition. If two links are lacking in the chain, failure is proportionately more signal and more speedy.

The automobile field was the promising field to thousands of investors. They saw the enormous demands that were sure to follow placing a private locomotive-passenger car in the hands of any citizen who could use it anywhere. Since the days of early Egypt man had been content with the horse until three decades ago when the bicycle made its debut. The two-wheeler blazed the way of possibilities for the automobile. It was sure then men throughout all countries would seek this new instrument of power. With a population of nearly 100,000,000 in the United States the selling possibilities were unlimited. Being looked upon as more or less of a luxury, good profits were sure to follow and there was a golden halo around every dollar invested in the building of automobiles.

Added to the passenger car field was that of the motor truck, a new industry whose compass none had even dared to estimate, or lift the veil and steal a glance of those days when the combustion motor shall till the soil, cut the corn and usurp horsedom from shore to shore. It was an appetizing prospect, it intoxicated the more enthusiastic of older industries. They rushed to its fold; they streamed in from the highways and byways.

With them they brought their old-time methods, their

old-time selves. Anybody could make automobiles; anybody could sell them. A season's output could be sold before the material was purchased. Deposits would convince a banker to advance money to build a factory; deposits would convince an accessory maker to give any line of credit; deposits would run the business. Deposits did it for a time, a short time, until competition grew and producton grew and automobiles had to be sold. Then the scale beam tipped the other way; "weighed and found wanting" was the general verdict. The courses of the law were the paths to the grave.

The automobile industry today offers as great a field as ever before. The world has millions of unconquered acres; our western plains call annually for help; South America is but an infant; Russia offers boundless possibilities; China is but opening the door; Canada is yet pioneering through its boundless northwest; Africa has fields yet undreamed of; Asia, with its millions in India and its southern countries, is an unopened book; and at our very doors are tens of thousands, yes, hundreds of thousands, waiting, waiting for the proposition—the car that meets their requirements and their pocketbooks. We are yet but climbing the foothills, the highest peak is far hidden in the future. It will yet be years before the broad possibilities of the industry can be comprehended—surely an immeasurable field for propositions. But the proposition must be right; the car suited to the times; the men to properly execute, to design, to produce and to merchandise; and lastly the necessary finances. It is a three-in-one proposition, but one which offers success to those who study, think, understand and plan.

Clubs and Individuals Contribute to Lincoln Highway

Hundreds Eager To Secure Certificate of Contribution to Famous Road

DETROIT, MICH., Aug. 23—The Lincoln Highway Association, the object of which is "to promote and procure the establishment of a continuous improved highway from the Atlantic to the Pacific, open to lawful traffic of all descriptions without toll charges," besides seeking contributions from automobile manufacturers, has instituted a campaign for obtaining small subscriptions from individuals. They are solicited for a contribution of $5 for which a certificate is issued acknowledging the contribution.

A. R. Pardington, secretary of the association, stated today that this scheme for augmenting the pledges of the manufacturers is meeting with unqualified success. The certificates are being sent to automobile dealers all over the country who are agreeing to dispose of certain quantities. The Packard Motor Car Co. has gone a step further in sending a supply of them to each of its representatives throughout the country. Other manufacturers will no doubt follow this lead.

That the certificate plan is going well is evidenced from the fact that automobile clubs are requesting certain numbers of them and have practically pledged themselves to dispose of them among their members. The Hoosier Motor Club of Indianapolis has requested 400, the Rochester, N. Y., Automobile Club has asked for 500, and the Cleveland automobile organization has applied for an equal number. These are but a few of the many examples of the way motor organizations everywhere are responding to the project. Secretary Pardington states that within a few months it is expected that fully 100,000 certificates will have been disposed of.

But not all of these are purchased at the minimum price of $5. There is a great deal of sentiment connected with them. One lady in Maine, for instance, paid $1,000 for hers so that she might have a certificate number 2, while another subscriber read of the plan and immediately sent his check to the National headquarters for $500 requesting a certain certificate number. Number 1 went to Henry B. Joy, president of the association.

The Good Roads Committee of the Automobile Chamber of Commerce has recognized the immense value of such a continuous transcontinental roadway to the automobile industry as well as to the country at large, and has taken a farsighted view of the existing need for it. The findings of this committee as voiced in the communication from Roy D. Chapin, its chairman, are well worth the consideration of every firm and industry allied with or dependent upon the automobile industry.

The committee's report follows:

After several months of investigation, your Good Roads Committee feels that it can now report favorably on the Ocean-to-Ocean Highway project. This plan is so comprehensive that it merited very thorough investigation on our part. We have had numerous conferences with Mr. Fisher and several discussions at meetings of the Executive Committee of the Association. Our conclusion is that if this Ocean-to-Ocean Highway plan can be put through, it will immediately stimulate a widespread construction of good roads throughout the country.

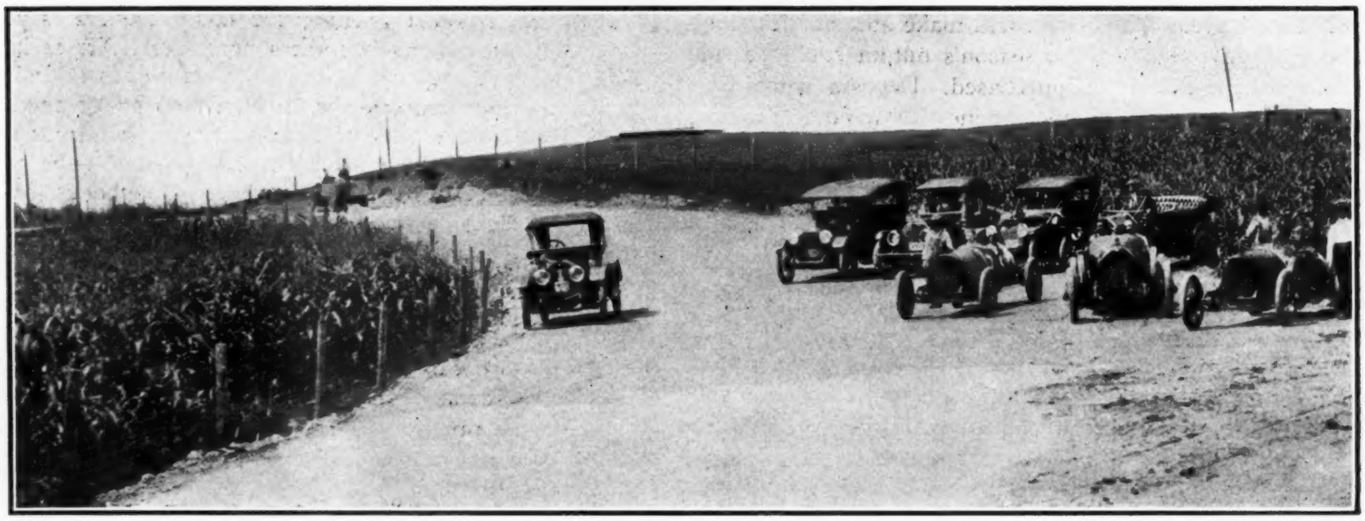
We feel certain that whatever route may be finally selected, two other transcontinental highways would follow shortly afterwards, since the people on the other routes will not permit the original road to monopolize all the touring. We believe that connecting links to this Ocean-to-Ocean Highway would be built north and south across the country, and its quick construction will serve as an example to the western states in highway building that will accelerate road construction immensely where none is going forward to-day.

Some day we are going to have good roads in America. The rapidity with which we secure these depends upon the automobile industry. Most of the manufacturers who have gone into the subject deeply agree that the future expansion of our industry is henceforth largely proportionate to the number of miles of good roads built each year. Three years from now our business may be in great need of a stimulus. Your committee feels that now is the time for us to assist generously in the construction of highways, so that by 1915 or 1916 our business will be continuously expanding, due to better roads. You have all seen how much better your product has sold whenever any state has constructed a fine road system.

Our analysis has made us believe that, entirely outside of the state and national aid campaign which we are carrying on, and will continue to carry on, the Ocean-to-Ocean Highway plan proposed by Mr. Fisher is feasible, and one meriting the co-operation of all interests benefited. While the sum to be paid seems large, its payment may be spread over three to five years. If the whole fund of $10,000,000 is not raised, the contribution is not binding, therefore no money will be asked for unless sufficient is raised to make the road an absolute certainty.

You will shortly hear from the Ocean-to-Ocean Highway Committee direct, when they will explain to you more fully the whole plan. If our committee can give you any further information, I will be glad to answer any letters on the subject.—R. D. CHAPIN, Chairman Good Roads Committee, Automobile Chamber of Commerce.

Each car in the recent Indiana-Pacific tour carried one of these flags, booming the Lincoln Highway



View of the new hairpin turn at the Elgin race course, Elgin, Ill. The old turn was dangerous

Galaxy of Stars for Elgin Classics

Practically All Noted Drivers in the Country Are Entered—Peugeot Car May Run—Pilette Fails Patterson

CHICAGO, ILL., Aug. 25—When the drawing for numbers for the fourth annual Elgin road races, promoted by the Chicago Automobile Club and the Elgin Automobile Road Race Association took place this afternoon, it developed the fact that the Middle West has been able to gather together the most brilliant field of cars and drivers in the annals of the Kane County classics. With but one or two exceptions—like Earl Cooper and Teddy Tetzlaff, of Pacific Coast fame—every pilot of note in the country has signed to participate in the speed battles which are scheduled for next Friday and Saturday. Dame Fortune, presiding over the drawing, decreed that the cars should start in the following order:

Chicago Automobile Club Trophy

No.	Car	Driver	No.	Car	Driver
20	Deltal	Dawson	24	Mason	Chandler
21	Mercer	De Palma	25	Nyberg	H. Endicott
22	Mason	Rickenbacher	26	Mason	Mulford
23	Mercer	Wishart	27	Mercer	Luttrell

Elgin National Trophy

1	Case	Bill Endicott	9	Nyberg	Madden
2	Mason	Rickenbacher	10	Deltal	Not named
3	Peugeot	Mulford	11	Nyberg	H. Endicott
4	Mercer	Wishart	12	Velie	Henning
5	Stutz	Anderson	14	Mercer	De Palma
6	Marmon	Dawson	15	Isotta	Grant
7	Mason	Haupt	16	Erwin Special	Bergdoll
8	Keeton	Burman	17	Tulsa	Hughes

The Peugeot, which is the same one that was driven to victory by Jules Goux, in the 500-mile race at Indianapolis, is entered conditionally by E. J. Schroeder. It will start provided a new front axle arrives in time. The part had been ordered from France, but when the car left New York last Saturday the axle had not yet arrived. There also is some doubt about Hughes, who was injured at a track meet in Oklahoma a month ago and it is doubtful if he has recovered enough to stand a gruelling race like the one in which he has entered.

Patterson Left Without Entry

It had been expected that both Hemery and Pilette, European drivers of note, would compete, the pair having been entered by E. C. Patterson, who contracted with Pilette for the latter to bring over two Mercedes sixes for Elgin. First Pilette was unable to find Hemery, he says, then he wired that he himself was too ill to visit this country. Also he declined to send a substitute or even a car, which left Patterson without an entry. It is said that Pilette's case will be brought to the attention of the European authorities and an effort made to have him barred from further competition until he straightens matters with Patterson.

Only Two Races This Year

Elgin has departed from custom this year in scheduling only two races, whereas last year five were run. Both races are at the same distance—301 miles—and an effort has been made to make one as important as the other. Each has the same prize money—$2,500, divided three ways, $1,750, $500 and $250. In addition on the first day there is a cash prize of $200 hung up by Ira M. Cobe, while David Beecroft is making the same offer for the second day. The two trophies are equally famous. The Chicago Automobile Club trophy, hung up the first day, is the old Cobe cup, which first was raced for at Crown Point in 1909 and won by Louis Chevrolet in a Buick and again on the Indianapolis speedway in 1910, when Joe Dawson, in a Marmon, won it. Since then it has been in retirement.

The Elgin National trophy is given by the Elgin National Watch Co., and has been raced for three times. Mulford, in a Lozier, took it in 1910, Zengel, in a National, in 1911, and DePalma, in a Mercedes, in 1912. Both Mulford and DePalma are trying for it again.

Course Shortened 350 Feet

The course this year is shortened about 350 feet because of the change made at McQueen's turn. To get away from a bad left-handed turn there Elgin has cut between two small hills and made a big bend which is so easy to negotiate that it can be taken wide open. Indeed, Bill Endicott and Grant have driven it at 70 miles an hour. The new measurement makes the circuit exactly 8 miles 2,030 feet in length.

Another improvement made in the course has been made in the back-stretch, where some of the narrow bits have been widened. Right now a few of these spots are a trifle rough but in general it is conceded that the circuit is in better shape than it ever has been. Whether or not the winners will do better than 70 miles an hour, DePalma's old mark, is doubtful, for the 450-inch limit prevails, whereas last year 600 was the limit. However, considering the class of the field, it would not be surprising if the record went in this year's big race. At all events, the management expects to see one of the keenest competitions held in this country for some time.

Boillot Breaks Record at Mont Ventoux

In Peugeot Covers the 13-Mile Hill-Climb in 17:38

PARIS, FRANCE, Aug. 23.—(*Special Cable* to THE AUTOMOBILE)—The Mont Ventoux hill climb was won today by Boillot, driving the Grand Prix Peugeot and breaking the record. He made it in 17:38, last year's record being 17:46, also made by a Peugeot with Boillot driving. Gehin in the Baby Peugeot was the winner in the cyclecar race.

The times made by the competitors were as follows:

Car	Driver	Time
Peugeot	Boillot	17:38
Aquila Italiana	Marsaglia	21:52
Aquila Italiana	Beria D'Argentina	22:58
Vermorel	Gaste	26:28
Schneider	Juvanon	28:17
Metallurgique	Riviere	26:42
CYCLECAR RACE.		
Peugeot	Gehin	31:30

Mont Ventoux stands out as the oldest, the most important and the most difficult hill climb in France. With a total length of a fraction over 13 miles, its maximum percentage is 13 over the last few hundred yards, and after the first few hundred yards it rarely drops below 8 per cent.

From 1909 to 1912 the record for the hill was held by Bablot, who on the Grand Prix Brasier driven by Thiery at Dieppe the previous year climbed the hill in 18 minutes 41 seconds.

Staver Breaks Newport Climb Record

INDIANAPOLIS, IND., Aug. 25—The annual hill-climb at Newport was held last Wednesday and Thursday, under the auspices of the Newport Automobile Club, and with the sanction of the American Automobile Association. W. S. Gilbreath, secretary of the Hoosier Motor Club, Indianapolis, was the official representative of the A. A. A.

There was an attendance of 2,500 on Wednesday and of 4,000 on Thursday. Company B of the First Regiment, Indiana National Guard, Terre Haute, policed the hill and there were no accidents. The hill is 1,600 feet long, ranging from a 3 per cent. to an 18.65 per cent. grade. There were twelve amateur events the first day. The program Thursday was for professionals only. A new record for the hill was established when D. C. Teeter, driving a Staver in one of the professional events, climbed the hill in 16 4-5 seconds.

A straight-away start of about 200 yards was allowed, with a turn at the foot of the hill. Many of the spectators and participants were from Illinois. Several Indiana counties were represented. I. M. Casebeer is president and J. B. Grauer is secretary of the Newport Motor Club. A summary of the events follows:

Wednesday

EVENT NO. 1—CLASS E, NON-STOCK, 230 CUBIC INCHES

Car	Driver	Time	Car	Driver	Time
Ford	E. McNees	21 4/5	Buick	W. T. Dee	32
Studebaker	K. R. O'Hair	24 3/5			

EVENT NO. 2—CLASS E. NON-STOCK, 231 TO 300 CUBIC INCHES

Car	Driver	Time	Car	Driver	Time
Ford	E. McNees	21 3/5	Halladay	E. C. Wolverton	28 2/5
Studebaker	K. R. O'Hair	25 4/5	Buick	W. T. Dee	32 3/5

Marmon and Parry entries were withdrawn.

EVENT NO. 3—CLASS E, NON-STOCK, 301 TO 450 CUBIC INCHES

Car	Driver	Time	Car	Driver	Time
Pope-Hartford	R. L. Ammerman	22	Jackson	Jack Stearns	29 2/5
National	J. A. Booe	28			

EVENT NO. 4—VERMILLION COUNTY, IND., DRIVERS

Car	Driver	Time	Car	Driver	Time
Pope-Hartford	R. L. Ammerman	22 1/5	National	J. A. Booe	27

EVENT NO. 5—EDGAR COUNTY, ILL., DRIVERS

Car	Driver	Time	Car	Driver	Time
Ford	E. McNees	21 3/5	Studebaker	K. R. O'Hair	25 1/5

EVENT NO. 6—FOUNTAIN COUNTY, IND., DRIVERS

Car	Driver	Time
Marion	Guy G. Bales	36

EVENT NO. 7—PARK COUNTY, IND., DRIVERS

Car	Driver	Time
Buick	W. T. Dee	31 3/5

A Parry entered by Elmer Garrard was withdrawn on account of mechanical trouble.

EVENT NO. 8—VIGO COUNTY, IND., DRIVERS

Car	Driver	Time
Pope-Hartford	Everett Hultz	21

EVENT NO. 9—AMATEUR DRIVERS OF FIFTH INDIANA CONGRESSIONAL DISTRICT.

Car	Driver	Time	Car	Driver	Time
Pope-Hartford	Everett Hultz	21 3/5	Pope-Hartford	R. L. Ammerman	22 1/5

EVENT NO. 10—NO ENTRIES

EVENT NO. 11—NO ENTRIES

EVENT NO. 12—CLASS D, NON-STOCK, FREE-FOR-ALL

Car	Driver	Time	Car	Driver	Time
Ford	E. McNees	21 1/5	Jackson	Jack Stearns	28
Pope-Hartford	Everett Hultz	21 2/5	Halladay	E. C. Wolverton	31 3/5
Buick	H. L. Johnson	21 3/5			

Buick, Marmon and Pope-Hartford did not start. A Gray Fox and Shambaugh were withdrawn on the ground they were professionals.

Thursday

EVENT NO. 1—NO ENTRIES

EVENT NO. 2—CLASS E, NON-STOCK, 231 TO 300 CUBIC INCHES PISTON DISPLACEMENT

Car	Driver	Time
Ford	S. U. Johnson	31 2/5

EVENT NO. 3—NO ENTRIES

EVENT NO. 4—Rain.

EVENT NO. 5—CLASS E, NON-STOCK, 451 TO 600 CUBIC INCHES

Car	Driver	Time	Car	Driver	Time
Staver	D. C. Teeter	16 4/5	Shambaugh	Chas. Shambaugh	21
Gray Fox	Frank Fox	18	Apperson	Claire Rhodes	31 2/5

EVENT NO. 6—CLASS D, NON-STOCK FREE-FOR-ALL

Car	Driver	Time	Car	Driver	Time
Gray Fox	Frank Fox	20	Apperson	Claire Rhodes	30
Shambaugh	Chas. Shambaugh	22			

A Staver entry was unable to run on account of a broken timing gear.

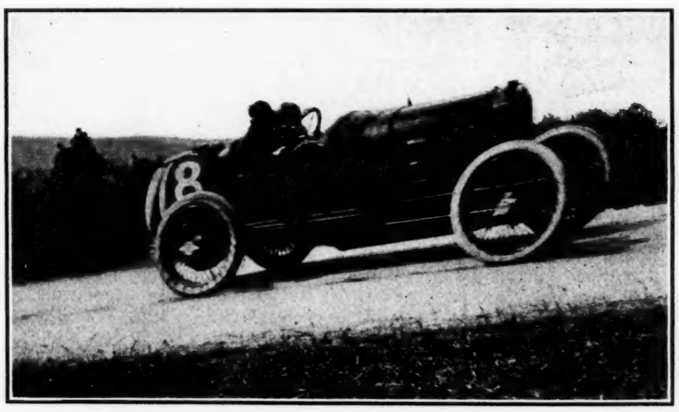
Hoosiers Welcome Tourists Home

INDIANAPOLIS, IND., Aug. 25—A complimentary dinner to the Indiana-Pacific tourists was given at the Claypool Hotel last Friday evening. About 400 Indianapolis and Indiana men were present to welcome home the men who recently completed the long trip to Los Angeles under the auspices of the Indiana Automobile Manufacturers' Association.

The toastmaster was Charles Warren Fairbanks, former vice-president of the United States, who for many years has been an enthusiastic motorist and an earnest advocate of good roads. The dinner was arranged by a committee representing the Indianapolis Board of Trade, Indianapolis Chamber of Commerce, the Hoosier Motor Club and the Indianapolis Automobile Trade Association. Dr. J. H. Taylor was chairman of the joint committee arranging the dinner.

Road Congress to Meet Sept. 29

DETROIT, MICH., Aug. 25—The American Road Congress will hold its third annual sessions in Detroit, commencing on the date of September 29. The meetings during the daytime will be held in the Convention Hall at the Wayne Gardens, while evening meetings and special sessions of committees and allied associations will take place at the Hotel Pontchartrain and other hotels. After the usual formalities of registration the Congress will be opened by the Hon. Logan Waller Page, president. There will also be an afternoon meeting on the same day.



Boillot, in the Peugeot, with which he broke the record for the Mont Ventoux hill-climb

Noairout Gets Injunction

Buffalo Specialty Co., Complainant, Restrains J. A. Schuler from Selling Its Patented Product

BUFFALO, N. Y., Aug. 26—*Special Telegram*—Judge Hazel, in the U. S. District Court today filed final decree with perpetual injunction restraining John A. Schuler, of Buffalo, from making, selling or imitating the patented product of the Buffalo Specialty Co., known as Noairout, used for stopping leaks in rubber automobile tires. The decree comes at the conclusion of a long contest, waged by the Buffalo Specialty Co. to restrain parties from manufacturing this product, on which it holds rights. Schuler was named defendant in the test case brought to trial. Judge Hazel, in his decision, holds Schuler guilty of infringing upon patents of complainant and ordered plaintiff to recover costs.

Charges and Countercharges in Walpole Case

BOSTON, Aug. 23—Once more Judge Dodge, in the United States district court here, put over today the settling on the question of an additional receiver to act with Robert C. Fischer, who was appointed some time ago, for the Walpole Tire & Rubber Company. Claims and counterclaims have been made, meetings have been held here and in New York, but nothing has resulted definitely. The judge now states that he will give a decision of some sort next Wednesday.

Racine Body Company Reorganized

RACINE, WIS., Aug. 23—The administrative and executive departments of the Racine Mfg. Co., Racine, Wis., metal and wooden automobile bodies, have been reorganized and an active campaign covering the entire country is under way. Frank K. Bull, who also is president of the J. I. Case T. M. Co., Racine, has retired as president, being succeeded by C. A. Hamilton, until now vice-president of the Lavigne Gear Co., Racine, and formerly with the Wisconsin Engine Co., Corliss. Mr. Bull was unable to devote as much time to the body plant as desired because of his other large interests. W. F. McCaughey, of Racine, has been elected vice-president. Harold Smith continues as secretary and George Jaeger as treasurer.

Hayes-Ionia to Increase Output

IONIA, MICH., Aug. 23—At the annual meeting of the Hayes-Ionia Automobile Co. it was decided to increase the output 25 per cent. for 1914. A dividend of 7 and 8 per cent. on preferred and common stock was declared. At the present time the payroll of the company is $6,000 a week and 400 men are now being employed. The business for the year just closed amounted to $500,000.

McK. White Leaves Marion Company

INDIANAPOLIS, IND., Aug. 25—W. McKay White, who was chairman of the recent tour of the Indiana Automobile Manufacturers' Association to the Pacific Coast, has announced his resignation as advertising manager of the Marion Motor Car Co., of this city.

Fulton Co. Buys Aermore Patents

MARSHALLTOWN, IA., Aug. 19—The Fulton Co., Marshalltown, Ia., has recently purchased the patents on the Aermore exhaust horns from the Aermore Mfg. Co., of Chicago, and will open up a manufacturing plant in Marshalltown. The Aermore Mfg. Co. will continue the manufacture of its various other specialties.

Bill for National Highway Supervision

WASHINGTON, D. C., Aug. 23—In order to encourage and systematize good road development in and between the several states and to equalize the burdens thereof, Congressman Hobson, of Georgia, has introduced a bill in Congress that contains a number of good features. It provides, in effect, that the director of the office of public roads be authorized to make and maintain a general survey of interstate highways, locating the natural trunk lines and branches, said survey to include general plans giving the type and estimate of cost of construction and improvement of each highway and its subdivisions, and to make a detailed survey of post roads and rural free delivery routes.

The bill further provides that the director of the office of public roads be authorized to co-operate with the highway authorities of any state in making a detailed survey of the roads of any state or any subdivision thereof or any road therein, this survey to include estimates of cost for improving and maintaining these roads, provided the amount expended by the director on any such survey shall not exceed one-half of the total cost of the survey.

Whenever any state or subdivision thereof, or any road district, shall authorize the improvement of any post road or any interstate road or any section or subdivision of same in carrying out the provisions of a survey and approved by the Secretary of Agriculture, then the said Secretary is authorized to pay one-half of the total cost of such improvements, payments to be made at such times and under such regulations as the Secretary may prescribe. The provision is made that before making any payment the Secretary shall be satisfied that after the completion of said improvement the road will be maintained by state or local authorities, or by both, in a proper condition of repair.

The newly created House Committee on Roads has the bill under consideration and Congressman Hobson has announced his intention of trying to secure the enactment of the bill.

To Build New Kerosene Motor

ST. LOUIS, MO., Aug. 26—The American Semi-Turbine Motor Co. has been organized in St. Louis, Mo., to build and market a new internal combustion coal-oil consuming engine for automobile and other uses.

The main features of the engine are the use of coil oil, the turbine fly wheel exhaust and forced air cooling. The use of kerosene in this engine is not governed by the ordinary carbureter, but is handled somewhat on the European plan of injecting it into the cylinder in the shape of a heated spray by means of an oil pump. This has long been the custom on motorcycles. The forced air cooling consists of forcing one charge of the air compressor per stroke around the cylinder walls of the combustion chamber, the air expanding in volume and pressure, and then exhausting on the turbine flywheel, thus assuring a pressure throughout the entire cycle of operation. Another feature of the engine is a separate air compressor mounted in tandem with the power cylinder, the charge of air being forced into a separate jacket and then into the working cylinder, where it mixes with the oil spray after both inlet and exhaust ports are closed, thus forming no combustible mixture except in the cylinder. This feature entirely eradicates the main faults in all two-cycle engines, namely, base explosions and leakage around the crankshaft. While this engine is built on the two-cycle plan, without cams or valves, it may be necessary to operate on the four-cycle principle by merely injecting oil on each second stroke, as recent tests on a 25-horsepower machine which is about completed show that the power is too great when working with an explosion in each cylinder per revolution.

NEW YORK CITY, Aug. 23—Two University of Wisconsin students—Edwin Kohl and Klaus Bergenthal—sailed today for Liverpool to complete an automobile trip around the world, kerosene instead of gasoline being the fuel that propels their Henderson car. They will earn their way around the globe by writing their experiences.

INDIANAPOLIS, IND., Aug. 25—Frank E. Smith, manager of the National Spring Co., New Castle, Ind., and who was for many years previous production manager of the Maxwell-Briscoe plant at New Castle, has been appointed to a similar position with the American Motors Co., of Indianapolis.

CHICAGO, ILL., Aug. 25—Webb Jay, who has been the vice-president and active manager of the Haynes Motor Car Co., of Chicago, has resigned and disposed of his interests in the concern. Mr. Jay's future plans are not definitely known. H. E. Doty succeeds Mr. Jay.

NEW YORK CITY, Aug. 26—Dyer, Dyer & Taylor have issued a license to the Touraine Motor Car Co., Philadelphia, Pa., manufacturer of the Touraine Six.

DETROIT, MICH., Aug. 27—H. D. W. MacKaye has severed his connection with the Keeton Motor Co., where he was assistant to the president. He is interested in a newly organized automobile company which will manufacture a car to list for less than $500.

Old Columbia Plant Closed

HARTFORD, CONN., Aug. 25.—Henry W. Nuckols, general manager of the Columbia Motor Car Co., stated this afternoon that the big plant at the corner of Park & Laurel streets would be closed down for good about the first of the month. Mr. Nuckols said that he did not know just what the Maxwell Motor Co. would do with the property which has been on the market for some time. When asked why the Maxwell organization desired to unload the plant, he said it was because they had no use for it. It is certain that the factory will not be operated again as a Maxwell proposition. Mr. Nuckols was asked how many Silent Knight type of six cylinder cars were built at the factory this season. He stated that a few had been built for samples.

Fighting Gasoline Prices

Automobilists Watching with Interest Efforts of Corporation Commission in Oklahoma To Regulate Rates

AUSTIN, TEX., Aug. 22—Automobilists and other users of gasoline in Texas, as well as state authorities, are watching with interest the efforts that are being made by the corporation commission of Oklahoma to regulate the price of the commodity in that state. It is claimed by Attorney General B. F. Looney of Texas that the manufacturers and sellers of petroleum products in this state discriminate against home consumers in the matter of prices. In Oklahoma the situation is even worse, as is shown by investigation. In some towns in that state gasoline is sold as low as 13 1-2 cents per gallon; in others the price is 16 cents, and in the extreme western part it is as high as 30 cents.

HARTFORD, CONN., Aug. 25—A meeting of the stockholders of the Pope Mfg. Co. has been called for September 22 at 2 p. m. to take final steps in the plan formulated and announced some months ago of changing the concern from a Connecticut to a Massachusetts corporation. The meeting is to be held at the company offices in this city and is for the purpose of terminating the corporate existence of the Connecticut company, all its assets having already been transferred to the Massachusetts company.

Dealers Fight City Ordinance

ST. LOUIS, MO., Aug. 25—The suit of Buick Motor Car Company et al.—thirty-eight dealers—against the City of St. Louis et al.—Building Commissioner McKelvey, Police Chief Young and City Counsellor Baird—to enjoin the latter from enforcing a garage law that would make all dealers and manufacturers secure permits to do business by special ordinance passed by the Municipal Assembly, went to the court Wednesday and Judge Hugo Grimm took the case under advisement.

The city in its answer says the dealers' petition merely presents an abstract question to the court and the only way to settle the matter of validity is to permit the building commissioner to proceed against the Buick people and contest the decision.

The automobile dealers insist that the notice sent by McKelvey ordering all dealers to get an ordinance is ample ground for the issuance of an injunction.

Herff-Brooks Corp. To Handle Marathon

INDIANAPOLIS, IND., Aug. 25—A motor sales corporation to handle the output of the Marathon Motor Works, Nashville, Tenn., was incorporated here last Tuesday with a capital stock of $100,000. The concern is under the firm name of the Herff-Brooks Corp., and will control the sale of Marathon cars throughout the world. The main offices of the concern will be maintained in this city, but distributing points will be placed throughout the country, work being begun immediately to that effect. The export trade will be handled by the new concern, with a competent man in charge of that department. Local men are interested in the company, having combined with H. H. Brooks, former sales manager of the Marathon Company. The men interested are George Herff, Herbert Herff and Jacob Herff, of the State Auto Company, former local distributors of the Marathon cars.

Motor Wagon Sale September 3

DETROIT, MICH., Aug. 26—The sale of the entire remaining assets of the Motor Wagon Co., recently adjudicated bankrupt, will be held at the factory on September 3 at 10 a. m. The assets to be disposed of consist of chassis, bodies, jackshafts, wheels and tires, parts, machinery, factory equipment, service cars, and office furniture and fixtures.

Connolly Maxwell Traffic Manager

CHICAGO, ILL., Aug. 26—L. R. Connolly of Chicago, for several years in the traffic department of the International Harvester Co., has been engaged as traffic manager of the J. D. Maxwell Motor Corp. and enters upon his new duties at Indianapolis September 1.

Automobile Securities Quotations

This week's automobile stock prices saw few changes. There was little trading, but bidding seemed to have remained on an equal footing with last week. The Consolidated Rubber Tire Co. common dropped 5 1-4, the preferred rose 8, and the Firestone Tire & Rubber Co. common dropped 10 points. The common stock of the General Motors Co. also experienced a drop of 9 points.

	1912		1913	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	145	165	150	170
Ajax-Grieb Rubber Co., pfd	95	100	95	100
Aluminum Castings, pfd	99	102	98	100
American Locomotive Co., com	45½	46	35⅛	35½
American Locomotive Co., pfd	109	110	102	103
Chalmers Motor Company, com	..	..	102	107
Chalmers Motor Company, pfd	..	..	97	102
Consolidated Rubber Tire Co., com	16	18	28¼	30¼
Consolidated Rubber Tire Co., pfd	50	59	88	100
Firestone Tire & Rubber Co., com	284	288	260	270
Firestone Tire & Rubber Co., pfd	106	108	102	104
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	..
Garford Company, preferred	..	..	92	95
General Motors Company, com	38½	40	30	35⅞
General Motors Company, pfd	79¾	81	78	81
B. F. Goodrich Company, com	76¾	77¼	30	30¼
B. F. Goodrich Company, pfd	107¼	108	90	92
Goodyear Tire & Rubber Co., com	330	335	275	280
Goodyear Tire & Rubber Co., pfd	106	107½	97	98
Hayes Manufacturing Company	..	97	..	..
International Motor Co., com	27½	28½	..	5
International Motor Co., pfd	84	85	10	18
Lozier Motor Company, com	..	..	16	..
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	4	4½
Maxwell Motor Co., 1st pfd	..	..	31	34
Maxwell Motor Co., 2nd pfd	..	..	8½	10
Miller Rubber Company	142	150	135	138
Packard Motor Company, pfd	105½	107	..	99
Peerless Motor Company, com	..	..	32	38
Peerless Motor Company, pfd	..	..	86	90
Pope Manufacturing Company, com	38	39	8	11
Pope Manufacturing Company, pfd	73	74	28	32
Portage Rubber Co., com	..	..	..	40
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	9¾	10¾	..	11
Reo Motor Car Company	23	25	..	18
Rubber Goods Mfg. Co., pfd	..	..	102	106
Studebaker Company, com	43	44	21½	25
Studebaker Company, pfd	94	95½	80	86
Swinehart Tire Company	95	97	85	88
U. S. Rubber Co., com	..	..	60½	60⅞
U. S. Rubber Co., 1st pfd	..	..	105⅛	105⅝
White Company, preferred	107½	..	104	107
Willys-Overland Co., com	..	..	63	64½
Willys-Overland Co., pfd	..	..	85	90

Market Changes of the Week

Few changes took place in this week's markets. Those of consequence were the drop in Bessemer and open-hearth steels to $25.00 per ton, and the drop of cottonseed oil to $8.00 per barrel, a loss of $0.90. Lead was steady at the close of the week, but fluctuated considerably in the early part of the week. Lead rose $0.05 per 100 pounds. Silk from Italy rose $0.10 and that from Japan also experienced a rise of $0.20. Tin rose $0.50 per 100 pounds. There was considerable activity in tin in both the domestic and foreign markets at the latter part of the week, with a sharp advance in all positions and more interest in future positions Speculative transactions in standard copper were again active in the London market, orders coming largely from American operators, causing a further sharp advance in the market for standard. American electrolytic was sympathetically held higher. There were, however, no changes in copper prices.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb	.07½	.07½	.07½	.07½	.07½	.07½	....
Beams & Channels, 100 lbs	1.61	1.61	1.61	1.61	1.61	1.61	....
Bessemer Steel, ton	27.00	27.00	27.00	25.00	25.00	25.00	—2.00
Copper, Elec., lb	.15¾	.15⅝	.15¾	.15¾	.15¾	.15¾	....
Copper, Lake, lb	.15⅞	.15⅞	.15⅞	.15⅞	.15⅞	.15⅞	....
Cottonseed Oil, lb	8.20	8.25	8.10	8.25	8.25	8.00	— .90
Cyanide Potash, lb	.19	.19	.19	.19	.19	.19	....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.33	....
Gasoline, Auto, 200 gals	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	....
Lard Oil, prime	.95	.95	.95	.95	.95	.95	....
Lead, 100 lbs	4.75	4.75	4.55	4.75	4.70	4.80	+ .05
Linseed Oil	.53	.53	.53	.53	.53	.53	....
Open-Hearth Steel, ton	27.00	27.00	27.00	25.00	25.00	25.00	—2.00
Petroleum, bbl., Kansas crude	1.03	1.03	1.03	1.03	1.03	1.03	....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	....
Silk, raw Italy	....	5.10	....	....	5.20	....	+ .10
Silk, raw Japan	....	4.05	....	....	4.25	....	+ .20
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb	41.50	41.35	41.25	41.20	41.50	42.00	+ .50
Tire, Scrap	.09½	.09½	.09½	.09½	.09½	.09½	....

RAMBLER'S New Engine.—The Thomas B. Jeffery Co., Kenosha, Wis., has installed another giant cross-compound engine directly connected to a huge alternating-current generator. This new unit, which comprised in shipment fourteen carloads with a total weight of over 500,000 pounds, has a capacity of 2,200 horsepower and will have for its foundation a concrete block weighing approximately 3,000,000 pounds. The flywheel of the engine, owing to its high rim velocity of 7,000 feet per minute, is cast entirely of steel. Its diameter is 23 feet and it weighs 60 tons. The generator alone has a total weight of over 70 tons. This great revolving mass of steel has a total weight of 160 tons and rotates at 100 revolutions per minute on a crankshaft which is 23 feet long and weighs 32 tons. In addition to this new power unit the Jeffery power plant is equipped with smaller units, making a grand total capacity of 3,925 net horsepower.

Loewenthal Plant Destroyed—The plant of the Loewenthal Rubber Company of Akron, O., was totally destroyed by fire recently, causing a loss of more than $100,000.

New Moose Jaw Co.—The Standard Automobile Company will soon be in operation in Moose Jaw, Sask., and will turn out cars equipped with wire wheels. The cars to be made will have electric lights and starters. They are to be made in six styles of bodies.

Tiffany Production Under Way—Production is well under way at the Tiffany Electric Car Co.'s factory at Pontiac, Mich., and deliveries will be made in about 30 days. L. R. Acton has been manager of this company, of which E. Leroy Pelletier is president.

Amplex Wants to Complete Work—A petition to continue the business of the Amplex Motor Car Works, South Bend, Ind., until automobile parts now in the course of construction are completed in order to raise money to help pay the claims against the concern was filed by the receiver recently.

Bremer-Wilson's New Plant—The Bremer-Wilson Mfg. Co., Benton Harbor, Mich., recently organized under the laws of Michigan for $150,000 to manufacture starters and accessories, has laid its plans for two plants. Its main building will be 60 by 100 feet and its bronze foundry will be 25 by 60 feet.

Goodrich Acquires Canadian Sand—The Goodrich Rubber Co., Toronto, Ont., has acquired from the Ontario Power Co. title to a large tract of land on the Chippewa Creek, a mile from its mouth, on which it proposes immediately to erect a large factory building or cluster of buildings. The company, it is stated, will within a year have at least 1,800 hands employed in the various departments.

Continental Takes Lozier Plant—The Continental Motor Mfg. Co., Detroit, Mich., has taken over the motor manufacturing department of the Lozier works at that city and is installing a new power plant which will double the capacity of motor production in the new factory recently completed. The company has also finished the building of an automatic screw machine plant at its Muskegon, Mich., branch.

Uhrlandt Opens Factory—The Uhrlandt Gas Generator Manufacturing Co., of Columbus, O., recently incorporated with a capital of $50,000 to manufacture gas generators of all kinds, has established offices at 82 West Broad street and has opened a factory at Linn and Ludlow streets.

Big Plant on Supply Parts—The Studebaker Corp., Detroit, Mich., has placed at the disposal of its service department an entire plant completely outfitted with expensive machinery and able to turn out on short notice parts for every model of its cars now in the hands of the public. The plant purchased by this company is at Pontiac, Mich., and was formerly known as the Vulcan Gear Works. The service plant will be known as No. 15 of the Studebaker system.

Cadillac Plants Closed—The Cadillac Motor Car Co., Detroit, Mich., has closed its plant during the vacation period from August 18 to September 3. It has been the custom in the past to take this collective vacation during what is known as the turn-over season between the close of production on one model and the starting of work for the following season. Due to the pressure brought by the agencies for immediate delivery of demonstrating cars of the 1914 model the factory has built 1,500 of the new cars before taking its vacation.

New Offices for Empire—New and larger quarters have been taken for the main offices of the Empire Automobile Co. in Indianapolis, Ind. Since its organization the main offices have been at 238 Massachusetts avenue, but will now be at 528 North Capitol avenue in the quarters formerly occupied by the Archey-Atkins Co. The Indianapolis sales branch of the Jones Speedometer Co. has been moved from the State Life Building to the building of the Pumpelly Battery Co. in North Capitol avenue and a service station has been established.

Bid on Hart-Kraft Plant—The plant of the Hart-Kraft Motor Co., North Duke street, York, Pa., was offered at public sale recently on the premises by the receiver, Donald H. Yost, but was withdrawn owing to the lack of a sufficient bid. It will be offered for sale again on September 9. The sale was conducted by W. S. Owen & Bro., who offered the plant in two lots, one including the real estate and machinery and the other the personal property. A number of out-of-town automobile manufacturers with other local business men were on hand, but bidders were few, the highest amount offered for the entire plant being $17,500.

The Automobile Calendar

Shows, Conventions, Etc.

Sept. 10..........New York City, S. A. E., Monthly Meeting Metropolitan Section.

Sept. 17-18........Cleveland, O., Annual Meeting of the National Brick Manufacturers Assn.

October 13........Philadelphia, Pa., National Fire Prevention Conference. Philadelphia Fire Prevention Commission.

Oct. 27-28.........Chicago, Ill., Convention of Electric Vehicle Association of America.

Oct. 27-28.........Chicago, Ill., Fourth Annual Convention, Electric Vehicle Assn. of America.

Dec. 9-12..........Philadelphia, Pa., Annual Convention of American Road Builders' Association.

Dec. 11-20.........New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.

Jan. 3-10, 1914.....New York City, Automobile Show, Grand Central Palace.

Jan. 24-31, 1914....Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.

Jan. 26-31, 1914....Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.

Jan. 31-Feb. 7, 1914.Minneapolis, Minn., Automobile Show.

Feb. 2-7...........Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Assn.

Feb. 9-14..........Buffalo, N. Y., Truck Show, Buffalo Automobile Dealers' Assn.

Feb. 21-28.........Newark, N. J., Automobile Show, N. J., Auto Trade Assn.

Feb. 22-March 5...Cincinnati, O., Automobile Show, Cincinnati Automobile Dealers' Assn.

Race Meets, Runs, Hill Climbs, Etc.

Aug. 25-28.........Houston, Tex., Reliability Run, Houston Auto Club.

Aug. 25-30.........Cleveland, O., Midsummer Show, Forest City Fair. Cleveland Automobile Show Co.

Aug. 29-30.........Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.

Aug. 30-Sept. 6.....Chicago, Ill., Reliability Run, Chicago Motor Club.

Aug. 31...........Beach Races, Oceanside, Cal.

September ....Grand Rapids, Mich., Tour, Grand Rapids Auto Club.

Sept. 1-2..........Sioux City, Ia., Track Race, Sioux City Auto Club & Speedway Assn.

Sept. 6............Track, Hamline, Minn., Minnesota State Fair.

Sept. 8-13..........Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.

Sept. 9............Corona, Cal., Track Race, Corona Automobile Assn.

Sept. 12...........Canfield, O., Track Meeting, Canfield Fair Assn.

Sept. 13...........Covington, Ky., Track Meeting, Cincinnati Automobile Club.

Sept. 13...........Grand Rapids, Mich., Track Races, Grand Rapids Automobile Club.

Sept. 20-21.........Detroit. Mich., Track Races, Michigan State Fair.

Sept. 27-28.........Bakersfield, Cal., Track Races, Kern Co. Fair Assn.

Nov. 4-5...........El Paso, Tex., Road Race to Phoenix, Ariz.

Nov. 4-5...........Los Angeles, Cal., Road Race to Phoenix, Ariz.

Nov. 4-5...........San Diego, Cal., Road Race to Phoenix, Ariz.

Nov. 6.............Phoenix, Ariz., Track Meeting, State Fair.

Nov. 24...........Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.

Nov. 27...........Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

Aug. 28-30.........Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent, International Exhibition.

Sept. 21...........Boulogne, France, 3-Litre Race.

Sept. 25...........Isle of Man, International Stock Car Race.

October 17-28......Paris, France, Automobile Show, Grand Palais, 10 days.

November ....London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Engineer — Dealer — Repairman — Garage

CONSTRUCTS TRACKLESS AUTOMOBILE TRAIN—Dr. L. C. Harvey, of Upland, Cal., near Los Angeles, after working for years to make an ideal touring outfit, announced recently that he had succeeded, and will shortly start with his wife and son on a 10 or 12-year tour throughout the United States, Canada and Mexico. Dr. Harvey has constructed a trackless train which provides every comfort and even many of the luxuries of home. His motor caravan, consisting of the auto and two large inclosed wagons, has in the equipment electric lights, running water, screen doors, spacious beds, writing tables and a library. And, should the doctor decide to leave the bulky wagons of the train behind, he can detach the motor car and tour about with all the comforts still at his command. For on a smaller scale he has duplicated the living facilities in the auto, which serves as a tractor. A Ford car is used, and the car, together with the various other conveniences, has cost nearly $10,000. The wagons are of special construction throughout. The running gear is the best, with roller bearings and springs, and equipped with air brakes. The floors are maple, the framework of hickory, and the siding and ceiling of oak. The furniture is built in as units with the body, also of oak. The couplings are arranged so that the two wagons pulled by the Ford will trail around corners and curves in the same tracks where the machine goes. The water system is arranged with a 15-gallon tank under the car. This tank is connected to the air line that operates the air brakes, and the pressure forces the water to the sink for cooking, dishwashing, and drinking. The radiator on the Ford is also connected to the water tank and is kept constantly filled for the extra cooking needed at the slow speed while pulling the train. An air tank on the tractor is kept filled with air by a pump on the engine, from which the tires are filled, the airbrakes are operated, the water forced to the pipes, the horn blown, and the motor started. The electric lights are supplied from a storage battery, which is kept charged by a dynamo on the auto. This supplies all lights on the car, as well as furnishing light for all purposes about the cars and the camp.

WAVERLEY AGENCY DISCONTINUED—The Waverley Sales Co., Washington, D. C., which handled the Waverley electric at 1337 Fourteenth St., N. W., has discontinued business.

BERDON RESIGNS—The resignation of A. E. Berdon as chief engineer for The Esterline Company, Indianapolis, Ind., has been announced. Mr. Berdon has not announced his future plans.

TIRE CHANGE IN BOSTON—Henry Frank, formerly manager of the New England branch of the Motz Tire Company at Boston, Mass., has resigned to accept a position with the Swinehart Tire Company in that city.

NEW TIRE MANAGER AT WORCESTER—W. H. Ellenbeck, formerly special representative of the United States Tire Co., has been appointed manager of the branch at Worcester, Mass., to succeed L. E. Hevaner, who has gone into the automobile business.

WRIGHT JOINS BODY CONCERN—James A. Wright, of New York, a leading designer of motor car bodies, has joined the staff of A. J. Monday, Milwaukee, Wis., one of the largest painting, trimming and body building concerns in the state of Wisconsin.

HANDLEY PRESIDENT N. Y. CONCERN—J. I. Handley, president of the J. I. Handley Corporation, has become president of the New York American-Marion Sales Co. He succeeds Charles E. Riess, who resigned recently to become identified with another company.

LARGE SERVICE STATION ESTABLISHED—What is said to be the largest service station between New York and Boston, Mass., is that conducted by Robert R. Ashwell at No. 341 Trumbull street, Hartford, Conn. The building was recently completed and will house 1,000 cars.

SANDERS MOON SALES MANAGER—E. N. Sanders, formerly manager of the Moon Motor Car Co. of East Moline, Ill., has been promoted to western sales manager of the Moon Motor Car Co., having complete jurisdiction over the sales in the states west of the Rocky Mountains.

AUTOMOBILE FREIGHT LINE ESTABLISHED—Using a Universal truck, a direct freight line has been established from Los Angeles to Fullerton, Cal. The car makes two trips each day. O. E. Moore is manager of the company, designated as the Los Angeles-Fullerton Transfer Co.

TAXI DECISION AFFECTS NEW ORLEANS—The upholding of the New York taxicab ordinance has caused the reopening of the same question in New Orleans. While the constitutionality of the New York ordinance was being tested the question was left pending in the southern city.

LEASE WASHINGTON WAREHOUSE—Miller Brothers, Ford agents, have leased the warehouse at 61-81 Pierce St., N. E., Washington, D. C., formerly occupied by the Studebaker Corporation, and will use it as a service department. It is the largest place of the kind in Washington.

STUDENTS WORK ON ROADS—Work on the Wayne County, Mich., concrete roads has appealed to many students in the University of Michigan, especially those of the civil engineering department. A large number of the boys have gained valuable experience in road building during their vacations for the last two years.

GONE TO STUTZ IN BOSTON—F. H. Freeman, for some time identified with the Henley-Kimball Co., Hudson agents in Boston, Mass., and later with the Berkeley Motor Car Co. in that city, resigned recently to take a position as sales manager of the New England branch of the Stutz Motor Car Co. in Boston.

NEW MILWAUKEE ACCESSORY HOUSE—A new motor car accessory and supply store is about to be opened in Milwaukee, Wis., by the Billings Brothers, Henry and Earl, who have taken a long-term lease on the store building at 181 Fourth St., near Grand Ave., and are putting in a large stock of goods.

HOLTON JOINS HANDLEY FORCES—Hoover Holton, who has been sales manager for the Empire Automobile Co., Indianapolis, Ind., since its organization, has resigned to join the forces of the J. I. Handley Co., Indianapolis, and will have active charge of sales of American cars in the states tributary to Kansas City, Mo.

NEW WELDING BRANCH—The Welding Co., Springfield, Mass., with branch shops in Boston, Holyoke, Hartford and Bridgeport, has opened its sixth shop at 281 Bridge St., Salem, Mass., where all kinds of jobbing will be carried out by means of the Davis-Bournonville high pressure, positive mixture oxy-acetylene welding equipment.

AUTOMOBILE FOR EACH 90 INHABITANTS—One motor vehicle to each ninety inhabitants of the city of Milwaukee is the ratio on August 15, 1913. The new city directory, recently issued, shows that the population of the city is 401,124, while the number of cars assessed for personal property taxation is 4,745. The increase in population over the previous year is 9,000, while during the same period the number of cars owned in the city has increased nearly 1,000.

BUYS 48 WHITE TAXICABS—Another big taxicab sale consisting of fifty vehicles was reported by the White Co., Cleveland, O., recently, closely following a sale of sixty-three White cabs to the Taxicab Co. of California, which was announced a few weeks ago. The purchaser was the Owen H. Fay Livery Co., Chicago, Ill., one of the largest cab operating companies in the windy city. Its order calls for forty-eight taxicabs and two 40-horsepower touring cars.

AUTOMOBILES AT OKLAHOMA STATE FAIR—Owing to the increase in the automobile business in Oklahoma, it is planned by the board of directors of the Oklahoma State Fair, to be held in Oklahoma City September 23 to October 4, to devote one entire building to automobiles, and plans are being discussed for holding a special program of some kind for the automobile show. Workmen are busily engaged remodelling the cement building which will be utilized for the show.

HARTFORD'S NEW TRUCK—The Hartford, Conn., water department has acquired a number of motor trucks during the past few months. One of the latest received is a 1½-ton truck. In order to care for these vehicles properly, a brick garage is being constructed at the pipe storage yards on Union street. The steady employment of an experienced mechanic and helpers to keep the cars in good working order is talked of. The trucks are used for hauling cast iron water pipe, wood and various supplies.

AUTOMOBILE FUNERAL CONCERN ORGANIZED—A company known as the La Bell Funeral Motor Car Co. has been organized in Detroit, Mich., for the purpose of putting out a funeral car and conducting funeral services. The car body is a subject of a patent issued to Mr. La Bell. The design calls for a compartment for the casket and flowers, and other compartments running crosswise of the car which will accommodate thirty mourners and six pallbearers. This funeral car can be built upon any of the standard truck chasses.

TO BUILD MUNICIPAL MACHINE SHOP—The Common Council of Superior, Wis., has instructed the city engineer to prepare plans and estimates for a municipal machine shop, 30 by 140 feet in size, for general city construction and repair work, but more especially for the purpose of the fire department. It is the intention of Chief A. T. Johnson, who suggested the municipal shop plan, to rebuild horse-drawn fire apparatus into motor-propelled equipment, and the shop will be provided with machine and tool equipment.

HAND WITH J. L. HANDLEY—E. H. Hand, for several years a prominent figure in the automobile industry as district manager and assistant sales manager of the old E. R. Thomas Co., and later as district manager in Ohio and Pennsylvania for the Abbott-Detroit Motor Co., has joined the staff of the J. I. Handley Co., of Indianapolis, Ind., selling agent for Marion and American Underslung cars. He will supervise the sale of the Marion car in the district which includes Cleveland, Pittsburgh, Buffalo, Philadelphia, Baltimore and Washington.

DETROIT'S NEW CIVIC IMPROVEMENT—A civic improvement of much benefit to motorists is being carried out at the corners entering the Grand Circus Parks, Detroit, Mich. The old curbing is being removed and a new corner radius of about 25 feet is being established in place of the 5-foot radius previously existing. This is a very wise move on the part of the city for the locality is soon to be known as Detroit's new hotel district, as ground is now being broken for several new hotel and office sky scrapers surrounding the twin parks, and the motor traffic here is destined to become very heavy.

BUS LINES PROFIT BY DISPUTE—As a result of a transit war between a Socialist administration and an obdurate street car company, a new bus line in the city of Schenectady, Pa., has had a rapid-fire growth. Beginning its service last April with one White 22-passenger bus, the operating company has purchased a new White every month and carried over 182,000 passengers in four months. Each bus has carried 24,000 passengers per month. The bus line had its inception in the refusal of the city to grant franchises for trolley extensions until the traction company restores six-for-a-quarter tickets.

AFTER SHORT MEASURE MAN—Frank S. Sperry, of Clinton, Conn., is the first man to be arrested under the new Connecticut law regarding weights and measures. He is alleged by the State police to have made several thousand dollars the past few years by selling gasoline at short measure. He is charged on three counts with short measure, although it is expected that additional complaints will be lodged against him now that an arrest has been made. Clinton residents allege that Sperry has been making at least $28 a day by leaving 90 gallons of gasoline when 100 were ordered and disposing of the rest to his friends; one of the beneficiaries being a garage in which he had a financial interest.

MICHIGAN REGISTRATION STATISTICS—Up to July 1, 1913, the secretary of state of Michigan has issued 47,198 automobile licenses for this year, which amounts to an increase of 13,199 over the first part of 1912. The motorcycle licenses amount to 4,775, or about 2,000 in excess of the previous year. The number of chauffeur's licenses issued is 765 more than the first six months of 1912. Taking the census of 1910, which gives Wayne County a population of 531,591, this makes one automobile license issued to one out of every 48 inhabitants, there having been 10,941 licenses issued to owners in that county. There have been 2,633 machines licensed in Kent County, in which Grand Rapids, the second largest city of the state, is located. Basing figures upon the 1910 census, this makes one automobile to every forty-eight persons.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BOSTON, MASS.—Chauncey S. Green Co.; capital, $20,000; to deal in automobiles. Incorporators: A. A. Hoyt, B. S. Atwood, C. S. Greene.
BOSTON, MASS.—Marathon Automobile Co.; capital, $25,000; to deal in automobiles. Incorporators: William Sanford, Bernard Killars, A. L. Schoolcraft.
BOSTON, MASS.—Moebus Wheel Co.; capital, $100,000; to manufacture automobile wheels. Incorporators: A. F. McGettrick, G. B. Ryan, H. W. Brown.
BRIDGEPORT, CONN.—Bridgeport Body Co.; capital, $50,000; to manufacture automobile bodies.
BRIDGEPORT, CONN.—Manufacturers' Sales Agency; capital, $25,000; to deal in automobiles. Incorporators: M. V. Doud, F. K. Doud, W. L. Scott.
CAMDEN, N. J.—S. & T. Auto Co.; capital, $25,000; to buy and sell and deal in new and second-hand automobiles and motor trucks. Incorporators: R. D. Hughes, Agnes Sattler, G. T. Sattler.
CHICAGO, ILL.—F. A. Woods, Inc.; capital, $12,000; to deal in automobiles and accessories. Incorporators: W. M. Carr, J. F. Carey, F. A. Woods.
CHICAGO, ILL.—Woods Mobilette Sales of Chicago; capital, $15,000; to deal in automobiles and accessories. Incorporators: J. F. Carey, M. Carr, D. B. Andrews.
COLD SPRING, N. Y.—H. F. Funke Co.; capital, $10,000; to deal in automobiles. Incorporators: H. M. Brigham, Aaron Michelson, H. F. L. Funke.
COLUMBUS, O.—Central Auto Vehicle Co.; capital, $10,000; to deal in automobiles. Incorporators: J. K. Kennedy, S. A. Webb, C. M. Addison, W. E. Benoy, A. W. McLaughlin.
CHICAGO, ILL.—Gren Motor Car Co.; capital, $25,000; to manufacture automobiles and motors. Incorporators: G. H. Wilkins, R. C. Steele, T. S. McCoy.
CRAWFORDSVILLE, IND.—Henry B. Coats; capital, $550,000; to manufacture an automobile wheel. Incorporators: William M. White, Frank M. Hurley, Irvin L. Garver, Henry Coats, B. A. Stubbins, E. E. Thomas, J. H. Swan.
DETROIT, MICH.—Harris Bros. Co.; capital, $251,000; to deal in automobiles. Incorporators: Abraham Harris, J. S. McDowell.
DETROIT, MICH.—La Bell Funeral Motor Car Co.; capital, $25,000; to manufacture automobile funeral cars. Incorporators: A. La Bell, T. C. Betzoldt, M. W. Benjamin.
FLUSHING, L. I.—Havana Motor Omnibus Co.; capital, $1,500,000; to manufacture, sell and deal in motor vehicles of all kinds, propelled by steam or electricity. Incorporators: A. S. Andres, R. S. Hull, R. A. Gamble.
FORT WORTH, TEX.—Chandler Car Co.; capital, $5,000; to deal in automobiles. Incorporators: B. K. Smith, M. H. Smith, R. E. Southern.
HARRISBURG, ILL.—Parish Ferrell Mfg. Co.; capital, $50,000; to manufacture automobiles and trucks. Incorporators: F. C. Ferrell, C. L. Parish, J. J. Parish.
INDIANAPOLIS, IND.—United Supply & Accessories Co.; capital, $10,000; to buy and sell automobiles, aeroplanes and other motor vehicles. Incorporators: E. B. Dill, Ed. J. Ilg, Chas. E. Rochat, Geo. L. Kempf, Ernest L. McClay.
JEFFERSON, WIS.—The Jefferson Auto Co.; capital, $6,000; to deal in automobiles. Incorporators: C. J. Puerner, H. W. Reul, J. N. Held.
LOS ANGELES, CAL.—The Motor Car Distributors Co.; to deal in motor trucks. Incorporators: F. W. Beau de Zart, A. C. Labrie, H. T. Bonn, C. W. Fish.
MONTREAL, QUE.—Canadian Drednot Motor Trucks, Ltd.; capital, $125,000; to manufacture motor trucks. Incorporators: W. L. Haskell, J. S. Riby, H. S. Ross, K. C. and J. E. Merritt, D. S. Whitehall, V. S. Ross.
NEW YORK, N. Y.—Frederick Smith Auto Sales Co.; to deal in autos and auto supplies. Incorporators: Alanson P. White, A. H. White, Harry Wolkof.
NEW YORK, N. Y.—George N. Kusel & Co.; capital, $1,000; to do a general automobile business. Incorporators: Geo. H. Kusel, Adolph Harnischfeger, Patrick O'Keefel.
NEW YORK, N. Y.—Liverani-Lombardi Motor Co.; capital, $20,000; to manufacture and deal in motors. Incorporators: Arthur P. Marr, Jos. Liverani, Francesco Lombardi.
ROCHESTER, N. Y.—Motor Register Co.; capital, $25,000; to distribute advertising novelties, and to buy and sell automobiles and motors. Incorporators: T. B. Pratt, C. A. Huber, C. F. Mosher.
ROCHESTER, N. Y.—Rochester Motors Co.; capital, $300,000; to do a general automobile business. Incorporators: Edward F. Davison, E. A. Grenelle, Albert H. Stearns.
SAN MARCOS, TEX.—Bradley Moore Auto Co.; capital, $6,000; to deal in automobiles. Incorporators: J. M. Moore, Frank Bradley, L. W. Wood.
SPOKANE, WASH.—Spokane Auto Mfg. Co.; capital, $50,000; to deal in automobiles. Incorporators: E. A. Torrance, R. H. Dickerson.
ST. LOUIS, MO.—Palmer-Meyer Motor Co.; capital, $100,000; to manufacture automobiles and accessories and equip a repair shop. Incorporators: Chas. W. Palmer, Frederick C. Meyer, Ferdinand A. Meier.
UTICA, N. Y.—H. W. Skinner Motor Car Co., Inc.; capital, $5,000. Incorporators: Harry W. Skinner, Edmund C. Richards, David C. Comstock.
VANCOUVER, B. C.—Auto Clearing House; Capital, $10,000; to deal in automobiles.
WILMINGTON, DEL.—American Cycle Car Co.; capital, $50,000; to manufacture cycle cars.

GARAGES AND ACCESSORIES

AKRON, O.—Seaton Metal Products Co.; capital, $30,000; to manufacture metal products and automobile accessories. Incorporators: L. J. Rothenbceker, C. A. Seaton, W. O. Lee, C. F. Miller, Charles Scimeca.
BOSTON, MASS.—Blue Hill Avenue Garage Co.; capital, $10,000; to carry on a general garage business. Incorporators: F. H. Sidelinger, W. A. Clark.
BOSTON, MASS.—Prest-O-Ceal Co.; capital, $25,000; to manufacture tire accessories. Incorporators: W. G. Todd, M. F. Hubbard.
BOSTON, MASS.—Superior Accessories Co.; capital, $20,000; to deal in automobile accessories. Incorporators: J. J. McCarthy, A. W. Woodruff, C. S. Gillespie.
BROOKLYN, N. Y.—South Brooklyn Garage, Inc.; capital, $5,000. Incorporators: Hal. C. Washburn, Chas. Bestelmann, August W. Rath.
BROOKLYN, N. Y.—Ohlesson Spring Tire Co.; capital, $30,000; to manufacture and deal in automobile accessories. Incorporators: C. J. Ohlesson, J. Maddocks, P. J. Butterly.
CHICAGO, ILL.—Auto-Hoist Co.; capital, $50,000; to manufacture automobile machinery. Incorporators: T. Monahan, C. Connelly, C. J. McGinnis.
CHICAGO, ILL.—Storage Battery Co.; capital, $30,000; to manufacture electrical supplies. Incorporators: H. A. Bioseat, W. H. Smith, Noah Divilbliss.
DETROIT, MICH.—Automatic Muffler Mfg. Co.; capital, $15,000; to manufacture and deal in mufflers and other automobile accessories.
DETROIT, MICH.—Gemmer-Detroit Starter Co.; capital, $200,000; to manufacture an automobile starter. Incorporators: G. A. Gemmer, L. W. Smith.
FALCONER, N. Y.—Falconer Iron Works; capital, $15,000; to repair automobiles. Incorporators: G. L. Gilbert, J. G. Wright, J. S. Wright.
GUILFORD, ME.—Tire Buyers, Inc.; capital, $60,000; to deal in automobile tires. Incorporators: Henry Hudson, J. H. Hudson.
LAFAYETTE, IND.—Lafayette Taxi Co.; capital, $10,000; to establish a taxicab service. Incorporators: Clark T. Bartee, Frank C. Neumann, Leonard F. Lefler.
LOUISVILLE, KY.—Reid Auto Co.; capital, $5,000; to rent automobiles. Incorporators: : A. E. Reid, Alta Reid, W. G. Clapp.
LYNN, MASS.—Eastern Avenue Garage; capital, $10,000; to carry on a general garage business. Incorporator: W. H. Beede.
MANITOWOC, WIS.—Town Herman Auto Transit Co.; capital, $8,000; to conduct a motor freight and passenger delivery line between several cities in that county. Incorporators: William Grosshuesch, August Frome, Jr., W. F. Buscher.
MARTINSVILLE, IND.—Citizens' Auto Co.; capital, $25,000; to operate a garage. Incorporators: W. E. Hendricks, E. L. Poston, T. A. Hendricks, Garfield Cramer.
MILWAUKEE, WIS.—The Ennis-Klink Oil Co.; capital, $7,000; to deal in oils. Incorporators: Eugene Klink, Joseph Ennis, A. A. Shead.
MOUNT VERNON, N. Y.—Mount Vernon Auto Station; capital, $3,000; to repair automobiles. Incorporators: William Bunn, L. A. Preston, Lucy Preston.
NEW YORK, N. Y.—Fordham Auto Van Co., Inc.; capital, $5,000. Incorporators: John Forbes, Catherine Kelly, Louis Bissinger.
NEW YORK, N. Y.—S. & K. Tire Co., Inc.; capital, $10,000; to manufacture rubber tires. Incorporators: Jas. J. Coomber, Herman Senner, Bernard J. Kaplan.
NEW YORK CITY—Tyreservice, Inc.; capital, $10,000; to deal in automobile supplies. Incorporators: J. C. Travis, C. L. Clune, M. M. Hovey.
NORWALK, CONN.—Cole-Roscoe Mfg. Co.; capital, $10,000; to manufacture parts and specialties.
NORWALK, CONN.—Todd Rubber Co.; capital, $2,000; to manufacture and deal in tires and other rubber articles. Incorporator: E. J. Todd.
OSHKOSH, WIS.—Public Parcel Checking Co.; capital, $100,000; to manufacture and market automatic wardrobes and parcel containers for garages, hotels, auditoriums and kindred purposes. Incorporator: M. C. Phillips.
PITTSBURGH, PA.—The Axwell Equipment Co.; capital, $5,000; to handle automobile supplies. Incorporators: E. Patterson, W. J. Mulvihill, J. R. D. Huston.
PLYMOUTH, MICH.—Automatic Muffler Co.; capital, $15,000; to manufacture automobile parts. Incorporators: W. D. Griffith, T. P. Sherman.
REGINA, SASK.—New Era Tire Treatment Co.; capital, $20,000; to manufacture tire accessories.
TOLEDO, O.—Toledo Co-Operative Garage Co.; capital, $10,000; to carry on a general garage business. Incorporators: H. L. Stebbens, Beatrice Rose, E. A. Schramm, Herbert Felker, John Felker.
WILLIAMSVILLE, N. Y.—Williamsville Auto Repair & Garage Co.; capital, $500; to carry on a general garage business. Incorporators: S. A. Hirsch, Christine Hirsch, G. W. Walters.

CHANGES OF NAME AND CAPITAL

DETROIT, MICH.—Wolverine Tire Co.; change of name to the Automobile Supply Co.
MILWAUKEE, WIS.—American Safety Appliance Co.; change of name to the Milwaukee Die Casting Co.
MILWAUKEE, WIS.—Standard Harness Co.; change of name to Standard-Racine Rubber Co.
TORONTO, ONT.—Motor Car Supply Co.; capital increased from $10,000 to $50,000.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Bowling Green, O.	Metz	C. D. Yonker
Cleveland, O.	Studebaker	A. R. Davis M. C. Co.
Columbus, O.	American	Gaither Auto Co.
Columbus, O.	Chalmers	Broad-Oak Auto Co.
Cresline, O.	Overland	Cresline Garage
Detroit, Mich.	Abbott-Detroit	Gaston-Richardson Co.
Fremont, O.	Studebaker	East Side Implement Co.
Greenville, O.	Overland	E. R. Swinger
Hartford, Conn.	Chalmers	F. L. Caulkins & Co.
Hartford, Conn.	Hudson	G. D. Knox
Independence, Mo.	Studebaker	Allen M. C. Co.
Lima, O.	Cole	Thomas Motor Co.
Los Angeles, Cal.	Maxwell	Lord M. C. Co.
Madison, Ind.	Franklin	Charles Gravens & Co.
Middlesex, Conn.	Chalmers	F. L. Caulkins & Co.
Milwaukee, Wis.	Abbott-Detroit	E. F. Sanger Co.
Minneapolis, Minn.	Monarch	Minn. M. C. Co.
Minneapolis, Minn.	Wahl	Minn. M. C. Co.
Montreal, Que.	Franklin	Juneau & Grothe
Mt. Vernon, O.	Ford	Auto Inn
Newark, O.	Overland	F. W. Simpson
New London, Conn.	Chalmers	F. L. Caulkins & Co.
Oklahoma City, Okla.	Hupmobile	W. H. Say
Outville, O.	Overland	F. M. Rugg
Paris, Ky.	Franklin	Bourbon Garage & Supply Co.
Peoria, Ill.	Norwalk	Wheeler & Wood
Philadelphia, Pa.	R-C-H	Colonial Motor Co.
Phoenix, Ariz.	Cadillac	W. A. Horrell
Portland, Ore.	Cole	Northwest Auto Co.
Providence, R. I.	Velie	Providence M. C. Co.
Seattle, Wash.	Abbott-Detroit	R. W. Abbott M. C. Co.
Sioux City, Ia.	Franklin	Thomas Murphy
Springfield, Mass.	Velie	Woodward M. C. Co.
St. Louis, Mo.	Kissel Kar	L. E. Newell
Tiffin, O.	Overland	H. J. Cochrel
Tolland, Conn.	Chalmers	F. L. Caulkins & Co.
Utica, O.	Overland	Dr. Lewis
Washington, D. C.	Haynes	Probey-Haynes M. C. Co.
Windham, Conn.	Hudson	G. D. Knox

COMMERCIAL VEHICLES

Place	Car	Agent
Atlanta, Ga.	Commerce	Alco Truck Co.
Baltimore, Md.	Commerce	Square Deal Auto Co.
Chicago, Ill.	Commerce	Commerce Truck Co.
Cleveland, O.	Jackson	S. F. Slansky
Dallas, Tex.	Commerce	Texas Wagon & Auto Co.
Detroit, Mich.	Republic	W. M. Hogle
Ft. Wayne, Ind.	Commerce	Electric Sup. & Auto Co.
Houston, Mo.	Kissel Kar	Rube Oglesby
Joliet, Ill.	Commerce	R. B. Rhoades
Little Rock, Ark.	Commerce	Paige-Detroit Auto Co.
Los Angeles, Cal.	Motodart	Motor Car Distributors Co.
Minneapolis, Minn.	Commerce	F. E. Murphy Auto Co.
Montreal, Que.	Atlantic	A. Jennings & Co.
Nashville, Tenn.	Commerce	Hersig & Black
Omaha, Neb.	Commerce	Johnson-Danford Auto Co.
Oshkosh, Wis.	Commerce	Hupmobile & Paige Auto Co.
Wilmington, Del.	Federal	Wilmington Auto Co.

Accessories for the Automobilist

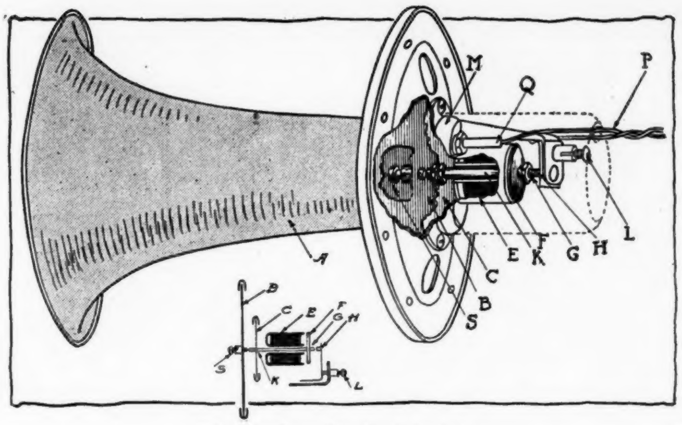


Fig. 3—Repello electric horn

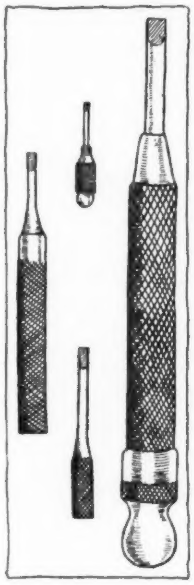


Fig. 1—Edelmann screwdriver

EDELMANN Telescopic Screwdriver—Fig. 1 shows the original idea embodied in the new telescopic screwdriver made by E. Edelmann & Co., Chicago. This device is a hollow screwdriver, in which another hollow one is included. The latter, in turn, contains a third one and in this the fourth one is found. The overall length of the whole device is 6 inches, the second, third and fourth screwdriver being 3, 1.75 inches and 1 inch long, respectively. All these tools are made of steel and their surfaces are grated in the manner of a file. The fourth screwdriver is threaded into the third, but this fits loosely into the second and the latter in the same manner into the largest which is closed by a cap threading on its end. Thus, for most jobs, the outermost screwdriver may be used, and the other tools contained in it do in no way interfere with its work, but if smaller screws are to be handled, out come the tools fitted for the work by virtue of their size.

Novel Gasoline Gauge—A new gasoline gauge has been placed on the market, which is of the dipping type, and is made of metal. The special characteristic of this gauge is that the metal is coated with a special compound, whereby the evaporation of gasoline is so retarded that it shows on the gauge 5 minutes after the latter has been drawn out of the tank. Fig. 2 shows the gauge. It is stamped with a hole for the Prest-O-Lite key in one end and with an opening in the other, permitting of hanging the device to a nail or the like. The figures 1, 2, etc., denoting gallons, are pressed in the metal at the proper places, the gauge being made for various types of cars. The gauge here shown is made by Traut & Heine, 1 Union Square, New York City.

Repello Electric Horn—The Premier Electric Horn Co., Chicago, makes the Repello horn, Fig. 3. This device operates on the buzzer principle, consisting of a solenoid coil, which is energized when a current passes through it, and consequently attracts an armature, the shaft of which has at one end a striking point hitting the diaphragm. When the armature is moved, the current energizing the coil is shut off and the armature shaft is returned to its original position by the action of a diaphragm-shaped spring which is in parallel with the vibrating diaphragm and held in a stationary frame at its rim. Fig. 3 shows the coil E and its armature F, the contact G-H which is broken when the armature is attached by the coil, the current leads P and Q and the adjusting screw L which serves for varying the distance between G and H and the consequent extent of the diaphragm vibration. The sound-producing diaphragm is shown at B, while C is the auxiliary one acting as a spring for returning the armature to its original position. A stud S in the center of B prevents indentation of the latter by the recurring striking of it by the armature end. Little current consumption and prompt response to the push button are the characteristics of this horn, which is furnished with a nickel or brass sound projector, while the rest of it is varnished black.

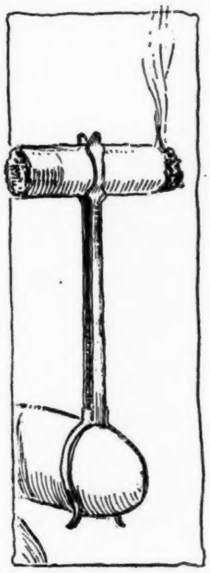


Fig. 4—Schiller cigarette holder

Schiller Cigarette Holder—The smoking automobilist who is fond of his cigarette will find the Schiller holder, Fig. 4, a very useful addition to this equipment. This device permits of holding the cigarette in a fitting position without interfering in any way with the other work one's hand has to do; for instance, the hand may be on the steering wheel and the cigarette holder being attached to it as shown in the illustration does away with all the trouble that formerly was necessary if one would hold a steering wheel and cigarette at the same time. The device is 2 inches long and gold plated in a nice manner to fit any surroundings. The Schiller Mfg. Co., 175 North State street, Chicago, Ill., manufactures this accessory.

Auster Limousine Seats—Auster, Ltd., 133 Long Acre, London W. C., England, makes the Auster patent portable seat which is shown in Fig. 5. This seat, designed for the interior of the body of an inclosed car, consists of a steel tubing body and a seat and back rest well put together and richly upholstered. As a consequence, the seats are light, and being foldable, as shown in Fig. 6, they take little space when not in use. The framework is either nickel or brass, but oxidized finish is also obtainable if the purchaser so desires.

Eclipse Headlight Shades—The Auto Mutual Accessories Co. of America, 1937 Broadway, New York City, is now marketing the Eclipse shades for headlights, which serve for taking the glare out of the shine emanating from these brilliant illuminating accessories. That this is necessary has been urged repeatedly by legislators and road users alike, and to satisfy this general demand, the Mutual company is now bringing out the device shown in Fig. 7. The product consists of a blind carried in a nickel tube, the canvas of the blind being wound around a shaft to the ends of which coil springs are so attached as to tend to draw the fabric into the tube. The free edge of the fabric is fitted with a thin steel rail, the center of which carries an eye, and through this passes the end of a cable. The other end of the cable, which is taut by being wound around a pulley, is fixed to the same, and a pinion carried by the pulley shaft is in mesh with a rack; a pedal is attached to the end of an elongation of the rack, and there is a notch cut into the under side of the elongation of the rack. The operation of the device is as

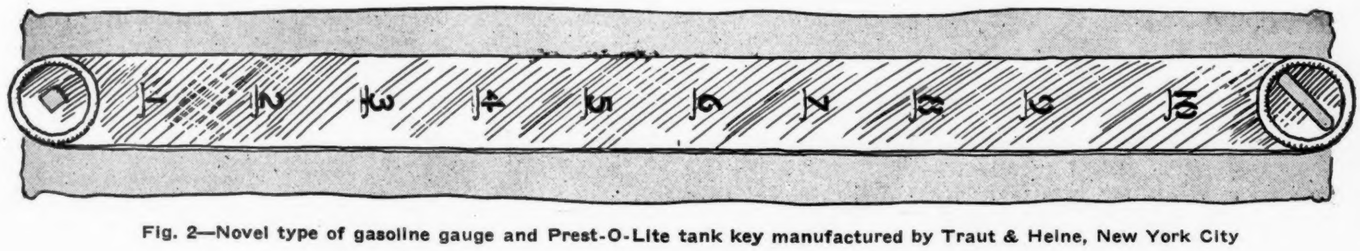


Fig. 2—Novel type of gasoline gauge and Prest-O-Lite tank key manufactured by Traut & Heine, New York City

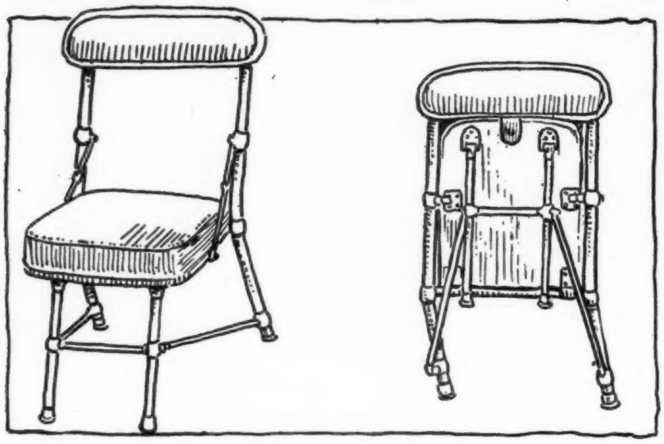


Fig. 5—Auster limousine seat. Fig. 6—Auster seat folded

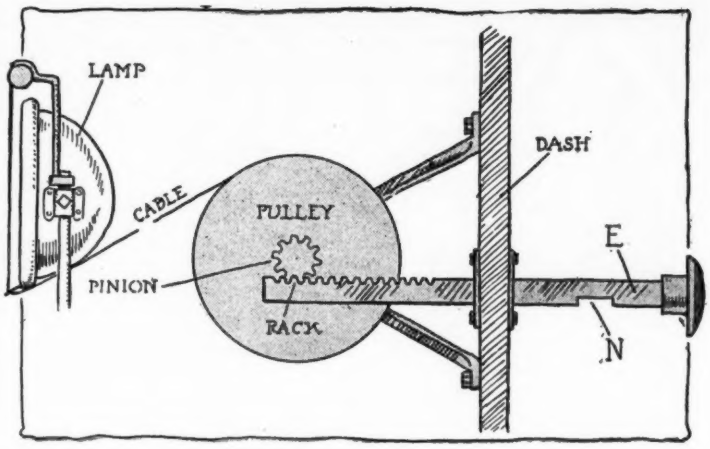


Fig. 7—Eclipse headlight shades

follows: If the pedal is pushed, the pinion is turned by the rack until the latter reaches the limit of its travel; this winds up the cable on the pulley turning together with the pinion and thereby draws down the curtains or shades before the headlights, as one pulley is connected to the two carrying the two cables, so that a single pedal, operating that common pulley, is made to actuate both shades. A notch N in the rack elongation E drops in a projection of the guide through which E passes, due to the turning effort of the pinion, which in turn is assisted by the pull of the spring in the tubes which hold the shades. A second pressure upon the pedal disengages the notch and consequently the springs in the shade tubes pull up the shades and draw the cables, which causes the pinion to move the rack backwards.

Always Air Tire Fluid—With the recent awakened interest in tire healing compounds comes the announcement of the opening of a branch house of the Always Air Mfg. Co., at 692 Woodward avenue, Detroit, under the name of the Always Air Sales Co. The product offered by this concern is a fluid to be put into the inner tubes of pneumatic tires for the purpose of healing up punctures and slow leaks. It is said to contain asbestos in its make-up and to be manufactured under two patents. The name shows that it does not belong to the tire filler class.

Shaler Vulkit Equipment—The new vulcanizer repair kit, Fig. 8, made by the C. A. Shaler Co., Waupun, Wis., is a handy set which serves for making repairs on inner tubes. The set consists of a kettle which is placed on an asbestos-faced support for the tube, a burner carrying a wick, which fits into the kettle, a measure for proportioning the fuel with which the wick is saturated, a roll of vulcanizing rubber, sand and wax paper, and a small can of cement. To the end of the support a cross arm is linked, which may be turned over to go across the kettle and be secured to the other end of the support by a bolt which carries a wing nut.

To make use of the device, the puncture to be repaired is first cured thoroughly with gasoline and then roughened with sandpaper contained in the same box as the roll of vulcanizing rubber. Then the section around the hole is cemented on all sides to a distance of .25 in. The hole is filled with layers of para rubber and then a patch of rubber .125 inch larger than the hole is cut and applied, being covered by a second patch .5 inch larger than the hole, cemented on to the first. The repaired portion is covered with waxpaper furnished with the equipment and is then inserted between the kettle and support securely attached to each other by means of the cross arm. Then the proper measure of gasoline or alcohol is poured slowly over the wick so as to saturate it, and when this has been done, the wick is lighted and allowed to burn until the flame goes out, after which the kettle heated by the flame is still left for 5 minutes on the tube. Then the tube is taken out of the vulcanizer and it is found to be repaired perfectly.

Pack Signal Device—A device which flashes the direction automobiles are to take at crossings is the invention of Edward E. Pack, Los Angeles, Cal. The system consists of four small signs placed on the front and rear fenders. They are lettered "right" and "left" and equipped with an electric bulb which lights at a pressure of a button at the driver's seat. If the driver is turning to the right he presses a button, the signs flash "right" on the right, front and rear fenders. The Los Angeles police department has adopted the system.

Akron Air Starting System—This equipment, Fig. 9, consists of a mechanism which acts either as a motor for or a compressor pumping air into a tank of a change-speed gearset for connecting the device to the driving gear of the car and valves for starting the motor and inflating tires and valves for working the starter and cutting out the air when the starter action is to cease. The motor and pump is shown at P, being connected at C1 to the connections which are operated by the starter valve S on the dash. The valve V serves for cutting out the air, while the pedal P, if pressed, engages the gearset G so that the motor is driven as a pump and fills the tank T1. The tire connection T equipped with a cock permits af attaching a tire-inflating hose to it, so that tires may be pumped up directly from the tank. The whole system weighs only 50 pounds and is, of course, installable on any type of automobile.

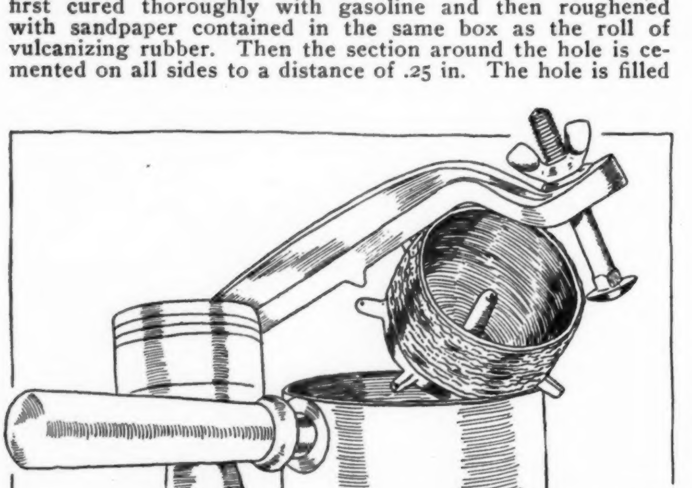


Fig. 8—Shaler Vulkit equipment

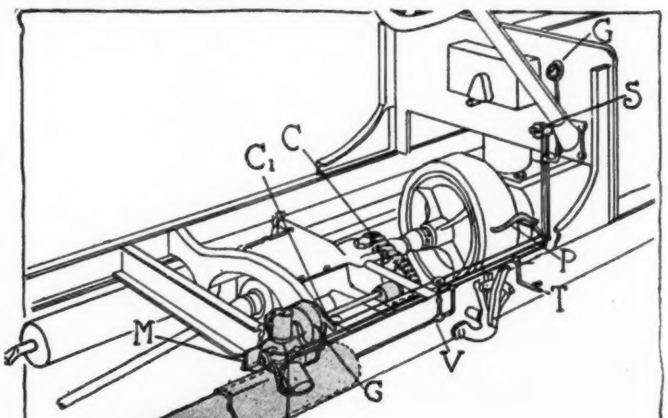


Fig. 9—Akron air starting system